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No. 25

MR. CARNEGIE EXPLAINS IN DETAIL.

It was noted in these columns lately that Canadians were offended that Mr. Andrew Carnegie had said that the making of steel in Nova Scotia was a mirage. Mr. Carnegie denied the interview, saying that he had never said anything of the kind, but Sydney was mortally hurt and declined to take his gift for a library. Mr. Carnegie has now written to the Toronto Globe detailing the entire circumstance. Mr. Carnegie certainly is to be completely exonerated. He writes:

"For the first time I have been made the victim of misplaced confidence in regard to the press. I was asked by a friend, whom I wished to oblige, to receive a literary man from whom they wished a sketch of your humble servant at work, not an ordinary interview, I had declined all requests for interviews in London, but there were reasons why I thought I should accede to this. I happened to be in a very amiable mood when the gentleman came. Two cards were sent up a few minutes later, one that of a high Australian official, the other a prominent Canadian. I presented the literary gentleman to them, and thought he would have a good opportunity to see and sketch me at work as desired, whatever that meant. He took a seat at the far end of the room, and I said to him: 'Remember, we shall have a free and lively conversation and comparison of views; nothing of all this for publication.' His words in reply were: 'You need not fear me, Mr. Carnegie; I am not a reporter. Not one word will ever be published that you do not see and approve.' Under this pledge the conversation was free and unrestrained.

"I presented my views that the union of the English-speaking race could alone give the motherland her rightful position, which was that of the venerated mother of the race, surrounded by all her sons, the English-speaking race united and supreme in the world. Part of my case consisted of noting the relative population and rate of increase of the parts. The other side gave their predictions in regard to the future enormous increases which are to take place. When it was suggested that Canada and Australia might wrest supremacy in steel manufacture from the United States, I said such an idea seemed to me a mirage. When it was suggested that Canada and Australia might in the future develop as the United States had done, I stated my belief that this seemed impossible, because there was only one Mississippi basin known to the world.

"When the literary gentleman took leave I said to him: 'You have heard a great deal, and no doubt have been much interested in the instructive comparison of views, but of course you understand this is all private and nothing is for publication.' He repeated that he would write nothing, publish nothing, except what I should see and approve. Let me here remark that the gentleman took no notes of the conversation. Had he done so, of course he would not have remained. My surprise and indignation at the breaking of this promise can well be imagined. The distortions, omissions and additions, as the sketcher remembered a private conversation, made a travesty of what was really said and how it was intended, or to what it was a reply. Instead of disparaging any part of our widely scattered race, I wish to harmonize and bring them all together, sharing each other's lot in one great whole. Such was the trend of every word I spoke. I never miss an opportunity to speak of the virtues of the Briton to the American, and vice versa, nor to laud the respective virtues of the absent Briton, Canadian, Australian and American to the member or members of our race who may be present. No one can have more at heart the prosperity of every English-speaking community throughout the world, nor wish more ardently to see them united. No one can exclaim more sincerely, 'Advance, Australia,' and 'The Maple Leaf Forever.'

"I advocate, however, the union of the race as the end in view. Empire consolidation may prove a necessary first step; if so, I am sure the second must follow. Let the Australians and Canadians who were so justly displeased with the extracts cabled from the unauthorized sketch just try to imagine my feelings when I saw the whole of the amazing production; and, Mr. Editor, when I visit Canada and you desire an interview, will you kindly send an ordinary interviewer? I have always found them good fellows, and never one abused his position in the slightest degree. I am done with the style of the literary gentleman. Yours for the race, and also with every good wish for all its members. 'May Canada progress.'"

CONGRESSMAN BURTON IN PARIS.

Congressman Burton, chairman in congress of the committee on rivers and harbors, had an extended conference last week with the minister of public works, M. Maruejouls, comparing the French and American systems of administering river and harbor work. It is understood that there are several features of the French system which Mr. Burton regards as practical for adoption by the United States. The last French appropriation for river and harbor work was $50,000,000. This amount was widely distributed with the proviso that the localities benefited should share part of the expense. For example, Dieppe is required to pay 65 per cent. of the extensive harbor improvement, and the city is given the right to reimburse itself by receiving the port dues. Owing to the magnitude of the American river and harbor estimates totalling $300,000,000, Mr. Burton says the French system requiring localities to contribute a share of the expenses of improvements is worthy of serious consideration. This will probably be a feature of the report to be made by Mr. Burton to congress and by Major Mahan, a retired member of the engineer corps who accompanies Mr. Burton, to the war department at Washington. Another feature of the French system is that work is only commenced after the appropriation of money sufficient for its completion. The public works minister was greatly interested in the magnitude of the American harbor improvements, particularly at New York and other seaboard points, and complimented the Americans on the modern nature of their port conveniences.

ERIE CANAL ENLARGEMENT.

The reply by canal improvement advocates of New York to the recent anti-canal statement given out by a number of state senators who oppose the 1,000-ton barge canal was made public a few days ago. It is signed by George Clinton, J. W. Fisher, R. R. Hefford of Buffalo; Henry B. Herbert, E. L. Boas, Gustav H. Schwab and Frank Brainard of New York; F. S. Witherbee of Port Henry and Frederick O. Clark of Oswego. Portions of the reply are as follows:

One of the most common statements made by the enemies of the canals is that the demand for the improvement of the canals can be traced to certain terminal, dock and elevator interests in the cities of New York and Buffalo. The facts are that while perhaps not the sole owners, the railroads centering at Buffalo and New York practically control the terminal, elevator, dock and lighterage interests of those ports and certainly they would not be likely to be clamoring for canal improvement. The opposition leave out of sight the fact that there is not a single commercial organization in the cities of New York and Buffalo that does not demand the enlargement and improvement of the Erie canal as provided for under the 1,000-ton barge canal plan, and the further fact that the preponderating business interests of both cities emphatically agree in urging the adoption of the proposed plan for the improvement of the waterways of the state.

The statement is sometimes made that there is no condition or emergency in the development of the great commercial centers of New York and Buffalo which would justify the incurring by the state of an indebtedness for the construction of the 1,000-ton barge canal. Admitting that the cities of New York and Buffalo have developed and prospered under the construction and operation of the Erie canal, which was a most efficient transportation route until within the last thirty years, the fact yet remains that the former commerce of the city of New York has not only shown a relative decrease as compared with competing cities of this country during the last twenty years, but has actually fallen off in export as well as in import trade in the last few years. Testimony goes to show conclusively that the commerce of the state of New York is now at the mercy and under the control of the railroad combinations, which, through discrimination, divert traffic to other ports and to other states as may best suit their convenience or their business interest; that the Erie canal is at the present time in a nearly useless condition, in which it cannot furnish the service required to compete with the railroads and exercise its former vocation of a regulator of transportation rates, whereas the roads have steadily and enormously increased their efficiency. The Erie canal today, in its neglected condition, carries a larger quantity of local freight, i. e., between points within the state, than foreign goods, and the same proportion will obtain in the improved canal, besides which, the possibilities of industrial development along the line of the canal through the saving in water transportation of coal, iron ore and other raw materials are unlimited.

Certainly this possible development of the industries of the interior of the state justifies the assertion that the proposed development of the Erie canal is expected to and will redound to the benefit of not only New York and Buffalo, but practically the entire state, from the lakes to the sea.

A report from the United States engineer office at Duluth is to the effect that vessels drawing full 15 ft. of water may now get in and out of Port Wing, a new lumber shipping port on Lake Superior which may also be used as a harbor of refuge. The channel is dredged to a width of 75 ft. The entrance lies just to the east of the vessel range established some years ago by private parties. The west bank of the present channel is on the line of the vessel range. Vessels in entering the channel are required to keep the range open a little on the east.

GLASGOW SHIPPING LETTER.

Glasgow, June 7.—The ship building yards are now working steadily at what work they have, and there is not likely to be any labor dispute for the next two or three months. In the middle of July comes the annual holiday period of this district, when all wage-earners lay themselves out for a spell of enjoyment, lasting from a week to three weeks, according to their circumstances and temperaments. In preparation for this summer carnival it is customary for workmen of all sorts and conditions to peg away steadily, so as to accumulate a little cash, and to postpone all grievances until after the holiday is past. The dispute among the iron molders, referred to last week, will be arranged somehow, but it does not affect relations between the Employer's Federation and the Ship Building & Allied Trade Unions, the iron molders association being an organization apart. The application of the coal owners for a reduction in wages has been postponed by the board of conciliation for a fortnight, and will doubtless be further put off until after the summer holidays.

The prospect is improving of cheaper ship building material. In sympathy with advices from your side, pig iron has now dropped here to a moderate level, which will compel manufacturers to reduce their prices for finished material, especially as the demand for finished iron and steel is rather abating. It is true that smelters have not yet reduced their quotations for pig iron in accordance with the decline in warrants, because they are kept busily employed with contracts, but that will pass. The striking feature in the ship building industry is that the new contracts booked each month are so far short of the month's launches. In May the Scotch contracts did not reach 20,000 tons. They included a cattle-carrier for the Nelson Line, to be built by Russell & Co.; a large sailer for German owners to be built by William Hamilton & Co., two large tugs for the Clyde Shipping Co., to be built by Ferguson Bros., Port Glasgow; and a number of hoppers, small coasters, sea-going lighters, etc. The launches in May bring up the total output of the five months in Scotland to 178,856 tons, comparing with 211,908 tons in the corresponding portion of 1902, 199,724 tons in 1901, 180,056 in 1900, 217,745 tons in 1899, and 176,536 tons in 1898—the lowest, therefore, of the past five years.

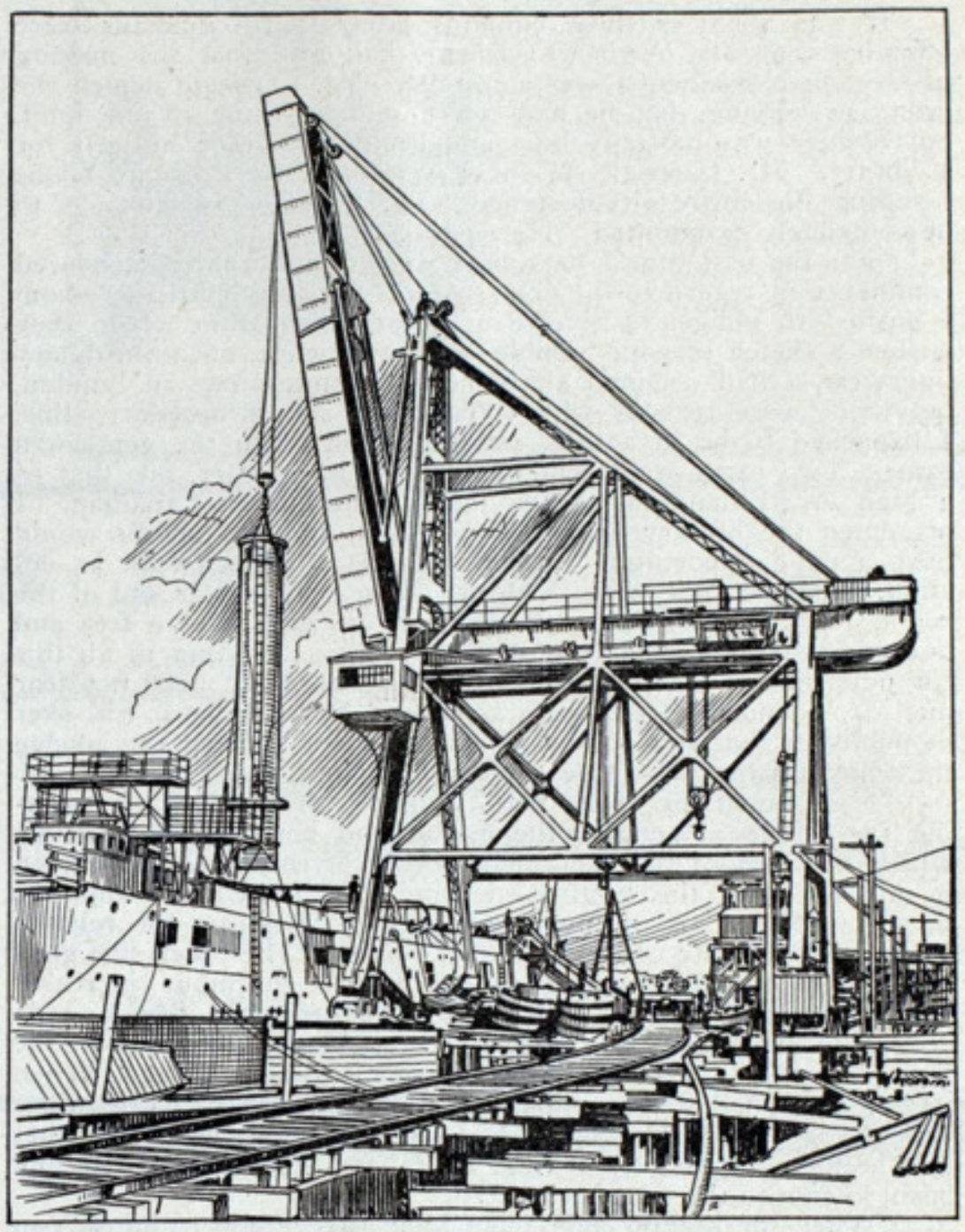
The recent loss of a Peruvian gunboat adds interest to the question now being investigated by an admiralty committee as to the structural strength of light craft in a seaway. There will probably be an inquiry into the loss of the Loreto, just as in the case of the Viper, and it is possible that the decision may be delivered with definiteness. The admiralty committee, composed of experts, has found it necessary to devote a large amount of research to the question. The Wolf, torpedo boat destroyer, was handed over to the committee for tests. She runs out from Falmouth when the sea is rough with the view of finding conditions as to hogging and sagging corresponding to those attained in the dock by suspending the ship at special points of support. There are in the hull twenty-four instruments, all calculated to ensure accuracy in comparisons as to stress or strains. The vessel was first supported only at the center, which would represent the condition when the hull was hogging on a wave crest, and afterwards the hull was carried on two points about 165 ft. apart to simulate the case of two waves lifting each end of the ship while the center sagged. The results agreed with the theoretical calculations. The effects duly recorded have not since been equalled in all the seas experienced during the winter and spring on the south coast, but it has been found that the changes from sagging to hogging are not so sudden as is generally supposed. The suggested cause of the loss of the Peruvian gunboat is that the heavy swell strained the ship and caused the seams to leak.

The Vulcan Ship Building Co., which is at Stettin, desires a yard on the North sea, where there would be no limitations as to the depth of water available for the departure of the largest ships. The company is one of the most progressive and successful of German industrial concerns. Its Atlantic liners, as well as warships built for the German and foreign navies, have gained renown, and as to finance, the capital is only £500,000 and a dividend of 14 per cent. was paid for the past financial year. The Stettin yard is not to be given up, but a new establishment is desired for the heavier ships. The large ships can only pass out to the Baltic from the River Oder with the assistance of pontoons to decrease their draught, even without coal and other stores, and with the help of an extra high tide. As to other ship building firms in Germany, it is reported that the Flensburg Co. made 18 per cent.; the Tecklenborg firm of Bremerhaven, 12 per cent., as compared with 20 per cent. a year ago; the Bremen Vulkan Co. 9 per cent., as against 12 per cent.; the Neptune Co. of Rostock, 9 per cent., same as in the previous year; the Rickmers Co. 7 per cent.; and the Howaldt Works of Kiel 5 per cent., as against 8 per cent.

The Fairfield Ship Building & Engineering Co., Ltd., has completed its contract with the admiralty for supplying and fitting new engines and boilers to the torpedo gunboat Jason, and the official trials have been carried out on the Firth of Clyde. On the low-power trial a speed of 15 knots was attained with 1,185 I. H. P. developed, and on the full-power trial of four runs over the measured mile at Skelmorlie the results were: Mean indicated horse power, 5,732; mean revolutions, 341; mean speed, 21.95 knots. In other vessels of this class the speed attained on trial was about 20½ knots, but with about 6,000 I. H. P. The Jason is now being fitted out complete for the Fleet Reserve. The torpedo gunboats Circe and Leda are also at Fairfield getting new engines and boilers.

FORE RIVER GANTRY CRANE.

The first practical test of the big traveling, folding jib gantry crane recently installed at the fitting-out basin of the Fore River Ship & Engine Co., Quincy Point, Boston harbor, was the stepping of the two 50-ft. stacks of the United States protected cruiser Des Moines, now nearing completion. Each stack weighs between 5 and 6 tons and was picked up from the dock and set in place at one lift. The Fore River gantry crane is the biggest of its kind in this country. The dock on which it travels consists of two parallel walls of stone and concrete, 56 ft. apart in centers and running the length of the basin, with a standard guage



Gantry Crane at Fore River—Largest in the Country.

railroad track midway between them, connecting at one end with the spur track on which materials are brought from the main line of the New Haven road into the yard. On each wall are two rails, set 4 ft. apart, and on these rails the crane travels on four four-wheel trucks, one under each leg.

The structure, which is built of bridge steel, is 105 ft. high, and its base measures 56 ft. from wall to wall and 50 ft. between the truck centers. The bottom of the jib is 49 ft. 6 in. above the track, and when it is raised vertically the end of the jib is 146 ft. above the rails, while its outreach from the center of the outer wall to the hoist is 94 ft. There are two lifting trolleys running back to the hindermost leg, one of 50 tons capacity and the other of 75 tons. At its farthest reach the crane can lift 20 tons. It will lift 25 tons 84 ft. from the center of the outer wall and 75 tons 52 ft. By means of it the heaviest armor plate or large guns can be put in place on the further side of a battleship lying in the fitting-out basin. It was designed and built by the Wellman-Seaver-Morgan Engineering Co. of Cleveland.

WORK AT FORE RIVER SHIP YARD.

With the new 16,000-ton battleship Vermont the Fore River ship yard at Quincy Point, Boston harbor, will be well filled up with work and the part of the building beach now in regular use will be fully occupied. The torpedo boat destroyer Macdonough, accepted by the government last month, is awaiting delivery. The cruiser Des Moines is getting the finishing touches at the fitting-out dock and will be given her trials in about a month. The six-masted steel schooner William L. Douglas will be put overboard early in August. The keel of the big freight steamer for the Fall River line is already on the blocks and that of the passenger boat will be laid this week. Three of the steel car floats just ordered for the New Haven railroad are being placed between the Fall River freighter and the six-master, and the fourth is to take the schooner's place as soon as she is launched. The battleships New Jersey and Rhode Island are officially credited with a greater percentage of completion than the vessels of their class started in other yards at the same time, and in spite of the delay caused by the navy department's recent change of plans for the purpose of strengthening the gun foundations on the heavier vessels, will be ready to take the water in December or January. The working force at Fore River is now close to 3,000 men—twice the number of a year ago—and is increasing every day, but the additional work on the new big contracts will make it necessary to enlarge it very considerably.

MEETING OF STEAMBOAT INSPECTORS.

Washington, D. C., June 17—It is expected that the board of supervising inspectors of steam vessels will be able to conclude their work within the next two weeks. A number of persons have been heard and a great many communications have been received bearing upon the proposed revision of the rules and regulations of the service. It is believed that practically everybody interested has been heard from, and the board is now devoting most of its time to the consideration of the recommendations that have been submitted. In order to facilitate this work sub-committees have been appointed as follows: On rules and regulations, Messrs. Stone, Dorsey and Oast; on boilers and machinery, Messrs. Rodie, Sloane and Cotter; on boiler appliances, Messrs. Oast, Sloane and Crumbaugh; on pilot rules (western rivers), Messrs. Sloane, Dorsey and Whittedge; on pilot rules (great lakes), Messrs. Westcott, Stone and Sloane; on pilot rules for the Atlantic and Pacific coasts and inland waters, Messrs. Cotter, Rodie and Oast; on fire apparatus, Messrs. Crumbaugh, Cotter and Oast; on life saving appliances, Messrs. Stone, Westcott and Rodie; on distribution of suggestions among the appropriate committees, Messrs. Dorsey, Crumbaugh and Westcott; on revision of the rules for phraseology, etc., Messrs. Crumbaugh, Westcott and Dorsey.

Since the last issue of the Review the American Boiler Manufacturers' Association has been heard by the board. It was represented by its president, Mr. E. D. Meier, who addressed the board on the questions of materials, construction and inspection. He had no new recommendations to offer, but he made it apparent that the boiler manufacturers still believe that the proper and most satisfactory way to adjust all the points of difference on these important matters would be through the appointment of a commission such as has heretofore been recommended to congress and to the secretary of the treasury. Mr. Meier expressed the hope that this commission would yet be organized for the purpose of revising the rules and regulations relating to the manufacture, installation and inspection of marine boilers. He had nothing new to suggest to the board announcing that he desired rather to wait until such a commission should be appointed to work upon the lines heretofore outlined by the association which he represented. He urged that Inspector-General Uhler should use his influence by argument and otherwise to secure the passage of the bill on this subject which failed to become law at the last session of congress.

On Tuesday the steel manufacturers of the country appeared before the board. They were represented by Mr. Carhart of the Illinois Steel Co.; Mr. McLeod of the Carnegie Steel Co.; Messrs. Bateman and Taggart of the Luken's Iron & Steel Co., and Mr. Geo. N. Riley of the National Tube Co. Each of these gentlemen spoke at some length upon the manufacture and disposition of steel as applied to the construction of marine boilers, and in the opinion of Mr. Uhler, the supervising inspector-general, at least offered some very valuable suggestions to the board. Among the propositions they submitted were the elimination of the physical test for steel tubes; additional privileges for the disposition of stamped plates; against increasing the tensile strength of steel; and requesting that they should be allowed some latitude in rolling plates for boiler construction and not be confined absolutely to the thickness of one one-hundredth part of an inch, as is now required by the regulations. A great deal of time was spent in talking over these subjects and the steel men were listened to attentively and their suggestions were thoroughly appreciated. Some of them will be adopted.

Wednesday was devoted to committee work and the consideration of the suggestions, petitions and memorials that have been presented. On Thursday and Friday the question of life-saving appliances was taken up and it is assured that some changes will be made in the regulations on this subject. Manufacturers and inventors of life rafts, preservers and other life-saving devices were heard and it is understood that some remarkable propositions were submitted. On Friday, after hearing Congressman A. G. Dayton of West Virginia, who is a prominent member of the committee on naval affairs of the house of representatives, upon the general revision of the rules and regulations, the board adjourned until Monday to allow the committees to make some progress with their work.

Four or five communications were received on Monday of this week of various character but as no one presented himself for a personal hearing the day was given up to committee work.

The number and character of the suggestions that have been offered are declared by Mr. Uhler to be encouraging to the efforts of the board to find and adopt everything necessary for the protection of life and property.

Every marine engineer and every designer of marine engines should read an article recently prepared by Mr. Charles Longstreth on "Metallic Packings—Principals of Design Essential for Successful Development." Although short, clearly written and in very plain language, the subject is well covered and the article altogether very instructive to the marine engineer or builder of marine engines, who will realize the importance of keeping well posted on metallic packings in view of their special adaptability to engines of the ships of today, representing as they do the very highest practice. The article was prepared for the Journal of the American Society of Naval Engineers and is in no sense an advertisement for any kind of packing, but the United States Metallic Packing Co. of 422 North Thirteenth street, Philadelphia, has seen fit, on account of its merits, to have it reprinted in a pamphlet, which they will very probably forward on application.

PHILADELPHIA SHIPPING MATTERS.

Philadelphia, June 17.—The work of constructing the big dry dock at the League Island navy yard is being actively prosecuted. The contractors began the work of laying the concrete bottom this week. Superintendent Schuster says he will have 1,000 men at work on the dock in July. The driving of the great piles to form a solid foundation for the stone structure of the dock is about one-third completed. Four thousand piles have been driven at one end of the excavation, forming an almost solid timber base. Work is being carried on night and day and the operation is proceeding without a hitch. A noted visitor to the dry dock last week was Dr. Genjivo Yamazaki, chief engineer of the Kawaaski Dockyard Co., Kobe, Japan, which has a contract to build a dry dock at Kobe. He visited the League island docks to secure hints and pointers concerning dry dock building, as the one at Kobe is to be built under peculiarly difficult conditions. At the location selected at Kobe he says there are 40 ft. of mud over a bed of sand. It will be impossible to build a cofferdam to keep out the water during the operation, and the dock will be constructed under water. Because of these conditions Dr. Yamazaki decided to seek aid from American engineers. After watching the operations at League island he will visit England and next fall will again pay another visit to the League island dry dock. He is said to be favorably impressed with American-made pile driving machinery.

Officials of the New York Ship Building Co., Camden, are well pleased over securing the contract to build the 16,000-ton battleship Kansas. Capt. William G. Randle, treasurer of the company, says that a large additional force in the ship yard will be put to work in due time. The force of draughtsmen will also be increased. Although no successor has as yet been appointed to Charles S. Hall (now vice-president of the New York Ship Building Co.) as purchasing agent, it is quite certain that Harry Archer Horner, chief electrician, will be appointed to that position by President De Courcey May. The 625-foot steamship Mongolian, being constructed by the New York company for the Pacific Mail Steamship Co., will be launched during the first week in July. Work on the Mongolian has been pushed expeditiously and the company will thus make another record for rapid vessel construction.

Don Emilio de Ojedo, Spanish minister to the United States, put in a day recently carefully inspecting the Cramp works. He said his visit to the ship yard had no special significance; that he merely wished to see so famous a works. He added, however, that the Spanish government expects to rebuild its navy and has had experts at work to that end for a long time past. The vessels will very probably be built at home. Senor de Ojedo was deeply impressed with the labor saving devices he saw at the Cramp works and it is the opinion of those in a position to know that American machinery will find a field in the Spanish ship yards where it will replace antiquated devices and tools. The United States may not build warships for Spain, but she may furnish new ship building machinery and tools.

F. F. Pendleton and Edward C. Plummer, president and secretary of the Atlantic Carriers' Association, visited the Maritime Exchange of Philadelphia last week for the purpose of securing material with which to fight legislation adverse to coast shipping that may be presented at the next session of congress. They have in mind bills of the kind that give American register to foreign-built vessels, and especially the bill that proposes to do this for the steamer Mira, released some time ago from a rocky shore in Nova Scotia and now undergoing repairs at Cramp's. Samuel B. Macdonell, a director of the Atlantic Carriers' Association, had the Messrs. Pendleton and Plummer under his guidance while they were in Philadelphia, and it is said they found the sentiment very strong in Quaker City marine circles against the granting of American register to foreign bottoms.

The H. R. Doerr Co., boat builders, is a new Camden industry. The firm has a finely-equipped machine shop and good yard facilities, to which a large additional building for general use has just been completed. Several launches are on the ways and in the near future the building of large boats will be commenced.

An order has just been given by Philadelphia parties to the Parsons Ship Building Co., Greenwich piers, for a house boat that is to cost $10,000.

A competitive examination for the position of hull draughtsman in the government service will be held at the federal building, Philadelphia, July 22, 23 and 24.

Edward Lewis, boss pattern maker at the Dialogue ship yards, Camden, died June 12, aged sixty-three years. He had been employed at the Dialogue yards for thirty-one years.

G. R. Dilkes & Co. of Philadelphia have purchased the New York tug C. L. Halenbeck.

The George Lawley & Son Corporation has acquired several acres of land adjacent to its works at South Boston. This land is occupied by the buildings of the old house of correction, which includes shops that may be made available for manufacturing purposes of the company. Later on it is probable that a new machine shop will be erected on the premises, but the officers of the company say the shop will not be built this year.

Contracts for the construction of the battleships Minnesota, Kansas and Vermont have been awarded to the Newport News Ship Building & Dry Dock Co., Newport News, Va., the New York Ship Building Co., Camden, N. J., and the Fore River Ship & Engine Co., Quincy, Mass.

UNITED STATES SHIP BUILDING CO'S. AFFAIRS.

Bondholders Oppose Plan of Reorganization and Apply for a Receiver—Mr. Nixon Resigns Presidency and Issues a Statement—Mr. Schwab's Position.

Affairs of the United States Ship Building Co. are apparently in a bad way. The first mortgage bondholders, or rather a part of them, are dissatisfied with the plan of reorganization and have petitioned the courts to show cause why a receiver should not be appointed. The hearing was to have been had on Monday of this week, but has now been postponed for a week. Meanwhile Lewis Nixon, president of the company, has tendered his resignation. Briefly the plan of reorganization contemplated the retirement of the present first mortgage bonds to be replaced with preferred stock, and to issue new first mortgage bonds in consideration of the putting into the property of $2,000,000 of additional cash. A portion of the present bondholders object to becoming preferred stockholders with a lien prior to theirs placed upon the property. Considerable ill feeling has been displayed and statements have been issued, thick and fast, by both sides. Mr. Charles M. Schwab is in practical control of the ship building company and it has been known for some time that he has not been in accord with Mr. Nixon. It was therefore a foregone conclusion that the reorganization would provide for Mr. Nixon's resignation; but on the other hand Mr. Nixon has been censured by the present bondholders for resigning and has been compared to a captain who deserts a sinking ship. Altogether the thing seems a very sorry mess. Mr. Nixon insists that he was not an original promoter of the ship building combination. In his statement he says:

"The first intimation that I had that a movement had been made to revive the idea of ship-building combination was through a telephone conversation with John W. Young last summer, in which he said he had returned from France with underwriting for a large sum and that he had arranged with Leroy Dresser, president of the Trust Company of the Republic, to obtain whatever additional underwriting was needed. I was at first most reluctant to again give an option, as I feared that having been offered before the value might be affected, but consented with a general understanding that if the others would agree to combine I would. Not one of the vendors had any part in making up the financial plan of the new company. The plants were all sold as going concerns, free from bonded or mortgage indebtedness, such indebtedness being discharged out of purchase money in all cases except the Harlan & Hollingsworth Co. at Wilmington, where it was paid by the company itself before the plant was turned over. Every opportunity was given to the accountants representing the organizers of the new company to acquaint themselves with the condition of the business at each place, just as is always necessary in such cases, including full examination of books, and no information was refused or books of original entry closed to examiners.

"Long-term contracts, such as we have in ship-building, have suffered greatly during the last two years, as it has been a period of industrial revolution, with steady rise of price of labor and cost of material, and especially has this been so during the time that has elapsed since the formation of the United States Ship Building Co. Hence, most of the smaller margined contract profits have been changed to losses and all estimated profits reduced. This is strikingly shown in the case of several ship yards outside the combination that have been in financial difficulty, owing to the conditions prevailing during the last year. The errors referred to by A. C. Gary, the treasurer of the company, were mainly in the estimate of asset values and in the forecast of profits, which, for the reasons mentioned, have not materialized. While experience has shown that the estimate of half a million increase in earnings, due to economies of operation, will be realized eventually, this saving cannot be relied on while the company is handicapped by need of additional facilities, larger working capital, money for repairs and until the decrease of energy of management at some of the plants, with the removal of local and personal responsibility, can be counteracted.

"Those who worked out the financial plan of the company provided $1,500,000 of bonds in the treasury, with every expectation that these would be available, as intended, for working capital. The unfortunate complications attending the launching of the company affected their value to such an extent that they could not be sold at a proper price, and, hence, could not be used, so that the company has had available for new working capital only $1,500,000 in new cash, a sum manifestly inadequate for its volume of business. The lack of working capital has greatly embarrassed the operations of the company. Five millions of working capital was shown in the prospectus. As $1,500,000 is in bonds this left $3,500,000 in cash and quick assets. According to Mr. Gary's letter this $3,500,000 is now $3,294,308.

"The accountants, I find, were instructed to report the amount of contracts for work in hand, and they stated the volume of work as about $34,000,000. This gave a measure of the capacity of the plants for carrying on work. Although a great deal of work has been turned over the volume of contracts remains practically the same. Mr. Gary did not give the volume of contract work, but as the vessels are in various stages of completion he gave the amount of money which it is estimated will be spent to complete them—namely, $14,675,449.

"To perfect the organization by having within the company an armor, gun and forge plant the Bethlehem company was acquired. As the companies had all to be practically reorganized and brought into touch with a central management, some check in production was inevitable while the new methods were being introduced, and the great earnings of the Bethlehem company were looked upon as an insurance against any temporary falling off in total earnings. No assistance, however, has been given the company as yet by the Bethlehem Steel Co., as all its earnings have been spent in providing additional facilities to take care of the enormous volume of work coming to it, though it has paid the interest on the bonds issued against that company. But it is stated by the reorganization committee that more than $1,000,000 will hereafter be released yearly from the earnings of the Bethlehem for the necessary purposes of the new company. I naturally look upon this reorganization from the same point of view as the other bondholders, as any change which affects the value of their securities affects mine in the same way. I gave my approval only because of a sincere conviction that under the present circumstances it was the best that could be obtained, and from an operative standpoint a radical reduction in fixed charges should certainly add to the stability of the new preferred stock and increase its attractiveness as an investment.

"The assets and contract profits of all the constituent companies have been cut in a most drastic way. New work is constantly coming in and all the companies have ample work before them. New money is needed and it can be obtained by the proposed plan, and no better one has been advanced. A receivership, even if the bondholders could work in harmony, might lead to many complications in connection with government work. With a management keenly alive to the interests of the stockholders, as this should be, the Sheldon syndicate controlling such a large amount of securities, there is no reason why the new preferred stock should not be of value.

"I have spent my life in practical ship building, and, not being a financier, have had but little to do with handling that branch of the company's business, but have felt to the full the harassing and discouraging effects of lack of working capital in my attempts to bring the plants and organization up to the efficiency they should have, and which they are gradually acquiring. I am not personally in accord with the policy of the organizers, my advice in regard to taking new work and making bids having been disregarded. In matters pertaining to the practical, as distinguished from the financial, character of the business, I must have certain liberty of action, and as it is inevitable that no such liberty can be assured to me during the process of reorganization, from the circumstances of the situation, I am not satisfied to remain longer at the head of the company, and have resigned, to take effect July 1. I know these ship yards to be splendid plants, well chosen from the point of view of specialization, with good rail connection and well situated from a labor standpoint. I could not improve their facilities as I wished, but they can without great expenditure be placed in shape to handle efficiently and profitably a much greater volume of work, though we take great pride in turning out even now over $14,000,000 worth of work in a year.

MR. CHARLES M. SCHWAB'S STATEMENT.

On the other hand also Mr. Charles M. Schwab insists that he went into the ship building combination at the earnest solicitation of Mr. Nixon and Mr. Leroy Dresser of the Trust Company of the Republic. He says that as the ship building company is a large consumer of steel he believed that the United States Steel Corporation would be benefited. He says:

"The first I knew of the organization of the ship building company was when Messrs. Nixon and Dresser, who were interested therein, asked me to take a financial interest in the enterprise by becoming one of the subscribers to the underwriting syndicate which was to finance the transaction. I had several visits from them on the subject, in which they made to me statements concerning the various companies going into the consolidation, their earning capacity and financial resources. I told them I had no desire to invest in that enterprise, but that I was always anxious, by personal investment or otherwise, to further the interests of the United States Steel Corporation, and if I felt sure that the ship yard consolidation, when organized, would patronize the Steel Corporation in all its steel requirements, I would make a subscription, and I accordingly became a subscriber to the extent of $500,000. In making my subscription I acted like every other subscriber, upon such facts and information as were presented to my consideration. Nothing was said about the Bethlehem Steel Co. or the ship building company acquiring any interest therein until long after my subscription was made, and, in fact, I believe after the organization of the ship building company. Mr. Dresser, who was then president of the Trust Company of the Republic, and Mr. Nixon called on me one day and wanted to know if they could secure control of the Bethlehem Steel Co. for their ship building company. At that time the prospectus of the ship building company had been published broadcast, the financial requirements, as I was informed, completely underwritten and subscribed for, and the securities formally offered to the public through the press.

"I told them that the control and disposition of the Bethlehem Steel Co. was with J. P. Morgan & Co., but that I would see them and ascertain what could be done for them in that connection. I called on J. P. Morgan & Co., and after several conferences they decided they would be willing to sell and dispose of the stock of the Bethlehem Steel Co., provided payment therefor would be made in cash. I communicated to Messrs. Nixon and Dresser the conclusion of Morgan & Co., and the former then wanted to know if I would be willing to assist them in securing the funds, as they had closed their underwriting for the ship building company. I entered into negotiations with them, looking to my furnishing the necessary cash requirements,

and we discussed, of course, the value of the Bethlehem Steel Co. property, its unique business position, its resources and earning capacity, and the large amount of earnings aggregating over $1,500,000, which had been accumulating since I first acquired the Bethlehem Steel Co., and which had not been withdrawn therefrom and which properly enhanced the investment therein to that extent. We finally agreed that I should secure for them the stock of the Bethlehem Steel Co. and furnish the money necessary to make payment therefor to J. P. Morgan & Co., and in consideration thereof I should have the benefit of the accumulations since I first bought the property, and receive $10,000,000 in bonds and $10,000,000 in each kind of fully paid stock. Thereupon I took up the matter with Morgan & Co., who insisted that they must have, in addition to the cash invested, 25 per cent. of each kind of stock which I was to receive, and which I agreed I would be willing to have Messrs. Nixon and Dresser deduct from the $10,000,000 of each kind of stock they had agreed to give me, so that Morgan & Co. might receive it as additional payment for the Bethlehem stock.

"My direct financial interest in this transaction, including the cash advancement for the purchase of the stock of the Bethlehem Steel Co. for Morgan & Co., and accumulated earnings invested in the company, aggregated over $9,000,000, instead of $3,000,000, as is stated in the complaint besides my subscription of $850,000 to the two first mortgage bond syndicates. Morgan & Co. had acquired the Bethlehem Steel Co. for the original Steel Corporation syndicate, and just before the winding up of the syndicate I purchased from J. P. Morgan & Co. the $2,500,000 of each kind of stock which they had received.

"When I had closed these negotiations I called in my counsel and stated the arrangements and said to him, in the presence and with the confirmation of Messrs. Nixon and Dresser, that I was to have a bond and mortgage which was to give me the best possible security for my undertakings in the transaction, and all legal requirements in connection with the transfer of the properties and issue of the securities on my arrangement should be subject to the approval of my counsel. At that time it was discussed and decided that among the conditions of the transaction was the fact that the bonds issued to me were to have voting power, that the working capital, equal to the then working capital of the Bethlehem Steel Co., which was then $4,000,000, should also be maintained; that, in order to insure the payment of the interest and sinking fund on the bonds to be issued to me, there should be a specific obligation on the part of the ship building company assuring dividends sufficient to meet these requirements; that the bonds issued on account of the ship building plants should not be a lien in any way on the Bethlehem Steel Co. stock or property, and that the first mortgage bondholders should have no interest therein in any sense whatever. These conditions, I understand, have been preserved in the mortgage securing the $10,000,000 of bonds issued to me. There is also a provision in the mortgage securing the first mortgage bonds, expressly stating the condition agreed upon, that neither the bondholders nor the trustees under the mortgage securing these first mortgage bonds have any right, lien or interest in the Bethlehem Steel Co. stock or property whatever.

"So far as the management of the ship building company is concerned, it is common knowledge that I left for Europe about the time that the Bethlehem transaction was consummated and was gone more than eight months. The management of the Bethlehem Steel Co. was in the hands of the same officers who managed it for years prior thereto, and the ship building company was under the management of Mr. Nixon and his associates. None of the persons upon the board of the ship building company, either as my representative or the representatives of the Bethlehem Steel Co., have done anything to embarrass the business of the ship building company or to endanger its security holders. Whatever weaknesses exist, it has now been demonstrated, existed prior to the organization of the ship building company, and are not due to any subsequent condition. I did not learn of the true state of affairs of the ship building company until my return from Europe a few months ago, and I was as much surprised as anybody and very considerably concerned.

"While I was in Europe I was cabled about the serious conditions of the Trust Company of the Republic and the formation of what was known as the Sheldon syndicate, and I joined with others in subscribing to that syndicate to assist the general financial situation then endangered by a possible collapse of the Trust Company of the Republic. My subscription to the Sheldon syndicate was $350,000. Shortly after my return from Europe, Mr. Wetmore, president of the North American company and one of the syndicate managers of the Sheldon syndicate, and a large holder of the first mortgage bonds, called upon me with reference to the affairs of the ship building company, and stated that he had been investigating the affairs of the ship building company, and found them in a very bad condition, and that he had been considering the question of reorganization of that company, and would like to have my co-operation. I discussed the matter with Mr. Wetmore and Mr. Sheldon on several occasions, and I told those gentlemen that my preference was to have nothing whatever to do with the ship building situation, and that I would like some arrangement by which I could restore to the ship building company all the stocks and bonds issued to me or J. P. Morgan & Co. in connection with the acquisition of the Bethlehem Steel Co. stock, and take back the Bethlehem stock; that on the showing of the Bethlehem Steel Co. I would have an investment which would be earning over 30 per cent. and that no plan of reorganization could be evolved which would give me any such possible earnings on any securities which I might receive.

"Messrs. Sheldon and Wetmore both insisted that they could not consent to that as the representatives of the first mortgage bondholders; that the Bethlehem was the backbone of the ship building company, and insisted that I was interested with them to help them in the reorganization for the benefit of everybody. They pointed out the fact that I was the largest holder of first mortgage bonds, that is, $850,000, and that I had therefore the largest interest in that situation. I told them, while I was perfectly willing to make sacrifices, my preference was to take back Bethlehem. After very considerable negotiation, I was persuaded to join them in the reorganization to be carried out on the basis promulgated. If the first mortgage bondholders cannot appreciate the sacrifices which I am making in this situation, they cannot too quickly arrange to act upon my suggestion to Messrs. Sheldon and Wetmore to either accept from me all the securities which the ship building company issued to J. P. Morgan and me in the transaction or that I proceed to foreclose and retake the Bethlehem property by foreclosure of my mortgage.

"In this plan of reorganization I am assuming large financial burdens, and I do so because the situation requires additional cash working capital, and Messrs. Sheldon and Wetmore stated they were unable to find any other persons interested in the transaction willing to supply the new cash. I would be very glad to be relieved of this cash burden and to have any other persons who are willing to do so, supply it and get all the benefits to be derived therefrom; but what I like better would be to take back Bethlehem and that the owners of the first mortgage bonds and stocks issued on account of the ship building plants, have all the benefits which might accrue to them from the separate possession and control of these plants. This I have been willing to forego as a result of persuasion on the part of Messrs. Sheldon and Wetmore acting for the first mortgage bondholders upon the basis of reorganization issued; and if the first mortgage bondholders sympathize with the complaints in this suit, I shall withdraw from the reorganization and seek the recovery of the Bethlehem Steel Co. stock."

Mr. Schwab on Monday of this week called what appeared to be a bluff of his opponents in the matter of the squabble over the ship building combination. While the dissatisfied bondholders were expressing doubts of the sincerity of Mr. Schwab's offer to take back the Bethlehem steel plant and give up all the ship yard company securities for which he sold it to the company Mr. Schwab was preparing the following to Samuel Untermyer, counsel:

"In the statement given by me to the press on Saturday afternoon, I stated among other things that I heretofore insisted and am now willing to surrender all the bonds and stocks received by me and J. P. Morgan & Co. for and on account of the capital stock of the Bethlehem Steel Co. upon delivery to me of the shares of stock of the Bethlehem Steel Co. In this morning's press I find a statement from you to the effect that you doubted the sincerity of my position and offer, and were I serious in that respect and willing to make surrender of all the bonds and stock so received and cancel the mortgage that I 'could be accommodated, no doubt, without delay.' From your statement, I assume, of course, that you are in a position to obtain the absolute and unconditional release and delivery to me of the capital stock of the Bethlehem Steel Co. That being so, and that there may be no doubt about my position and sincerity of my present offer, I will say to you that upon the absolute and unconditional delivery to me of the 300,000 shares of the capital stock of the Bethlehem Steel Co. now deposited with the New York Security & Trust Co. under the mortgage, I will have made an absolute and unconditional surrender of the $10,000,000 of bonds and $10,000,000 of each kind of stock of the United States Ship Building Co. which were received by me and J. P. Morgan & Co. on account of the capital stock of the Bethlehem Steel Co. I hope you will be able to accomplish this expeditiously and enable the holders of the first-mortgage bonds and stocks issued on account of the ship building plants to promptly and successfully adjust their affairs."

Mr. Schwab bought the 300,000 shares of the capital stock of the Bethlehem Steel Co. for $24 a share, or $7,200,000. The par value of the stock is $50. He took in payment for these shares bonds to the value of $10,000,000, which, as noted above, are a lien on the Bethlehem plant, and $20,000,000 of ship building stock, equally divided between preferred and common.

COAST SHIP YARD NOTES.

Mr. J. B. Drake of Bath, Me., has given an order to the New England Ship Building Co. for a four-masted schooner of the following dimensions: Length, 181 ft.; beam, 39 ft.; depth, 18 ft.

Calumet is the name of a steamer just launched at Lawley's ship yard, South Boston, Mass., for Charles G. Emery of New York. Following are her dimensions: Length, 145 ft.; beam, 17 ft. 9 in.; draught, 7 ft. She is equipped with a triple-expansion engine and Norman water-tube boiler.

Last week Kelley, Spear & Co., Bath, Me., launched the four-masted schooner George W. Truitt for Capt. George W. Elzey of Bethel, Del. The Truitt is of the following dimensions: Length, 187 ft.; beam, 37 ft.; depth, 13 ft. The schooner is a new model by the veteran draughtsman, F. W. Rideout, and Capt. Elzey is confident that she will prove a good carrier and sailer. She is the 121st vessel built by Kelley, Spear & Co.

NEWS OF THE GREAT LAKES

LAKE FREIGHTS—BUSINESS OUTLOOK.

Not more than a week or ten days ago a cut of 5 cents a ton was made in lake freights on iron ore. The outlook seemed unfavorable on account of the very large amount of freight of all kinds that had been moved in May. The general movement of freight on June 1 was, in fact, fully up to that of a year ago, although vessels were very much delayed in starting this year. Probably the action of the shippers in reducing ore rates was a mistake. Whether it was or not, the situation is now materially changed. Quite a few vessels were diverted to the Chicago grain trade and delays at ore and coal docks have been so general and long-drawn-out as to cause a scarcity of vessels at the ore shipping ports. The freight market, therefore, instead of taking the downward tendency that was expected little more than a week ago is now quite strong.

As regards the outlook in the iron and steel industries, which are so closely allied to the lake trade, there is little new to be said. Pig iron is being produced at the rate of nearly 400,000 tons a week—greatest record in the history of this or any other country—but the accumulation thus far is not equal even to the imports of foreign iron. It is still asserted by representatives of the big steel organizations that large orders for steel rails must be carried over to 1904 on account of inability to care for business already on their books, and in all other lines of iron and steel manufacture the mills are also still loaded up but with less certainty as to business for next year. It is reported from New York that directors of the United States Steel Corporation will in a few days fix and publish the Corporation price list for finished material for the year 1904 and that the schedule will not show any very material changes from the current price list.

BIG REPAIR JOB ON STEAMER SARANAC.

A repair job just completed on the steel steamer Saranac of the Lehigh Valley Line at the works of the Ship Owners' Dry Dock Co., Chicago, was of a very extensive kind, probably the largest ever undertaken except on vessels abandoned to the insurance companies. The Saranac has been under repairs since she struck an uncharted reef on Lake Michigan on her first trip up the lakes this season, in April. The principal items of repair were forty plates taken off her bottom and replaced; nearly all the main and spar deck plates removed and replaced; several broken beams and stanchions renewed; the shell of the steamer practically entirely reriveted from 30 ft. abaft the stem to 40 ft. forward of the stern post; a great deal of repairs to deck houses and cabins, and entire new bulwarks. A large quantity of steam fitting and electrical work was also done. When the steamer left the dry dock she looked like an entirely new ship.

DEATH OF CAPT. SINCLAIR.

Capt. James R. Sinclair, local manager in Chicago for the Great Lakes Towing Co., died at his home in Austin on Monday of this week. Capt. Sinclair had the reputation of being one of the most competent tug men on the great lakes. The cause of his death was heart failure, which was attributed to overwork and worry in connection with the long tug strike. He went south after the settlement of the strike and endeavored to regain his lost strength, but with only partial success. All of Capt. Sinclair's business life had been spent with the Dunham Towing & Wrecking Co., which is a part of the tug combination. He began as a fireman on one of Capt. Dunham's tugs when a mere lad and was placed in charge of a tug at the early age of nineteen years. Later he entered the office of superintendent of the line. Capt. Sinclair was born in London, Canada, and was forty-nine years old. He leaves a widow and four children.

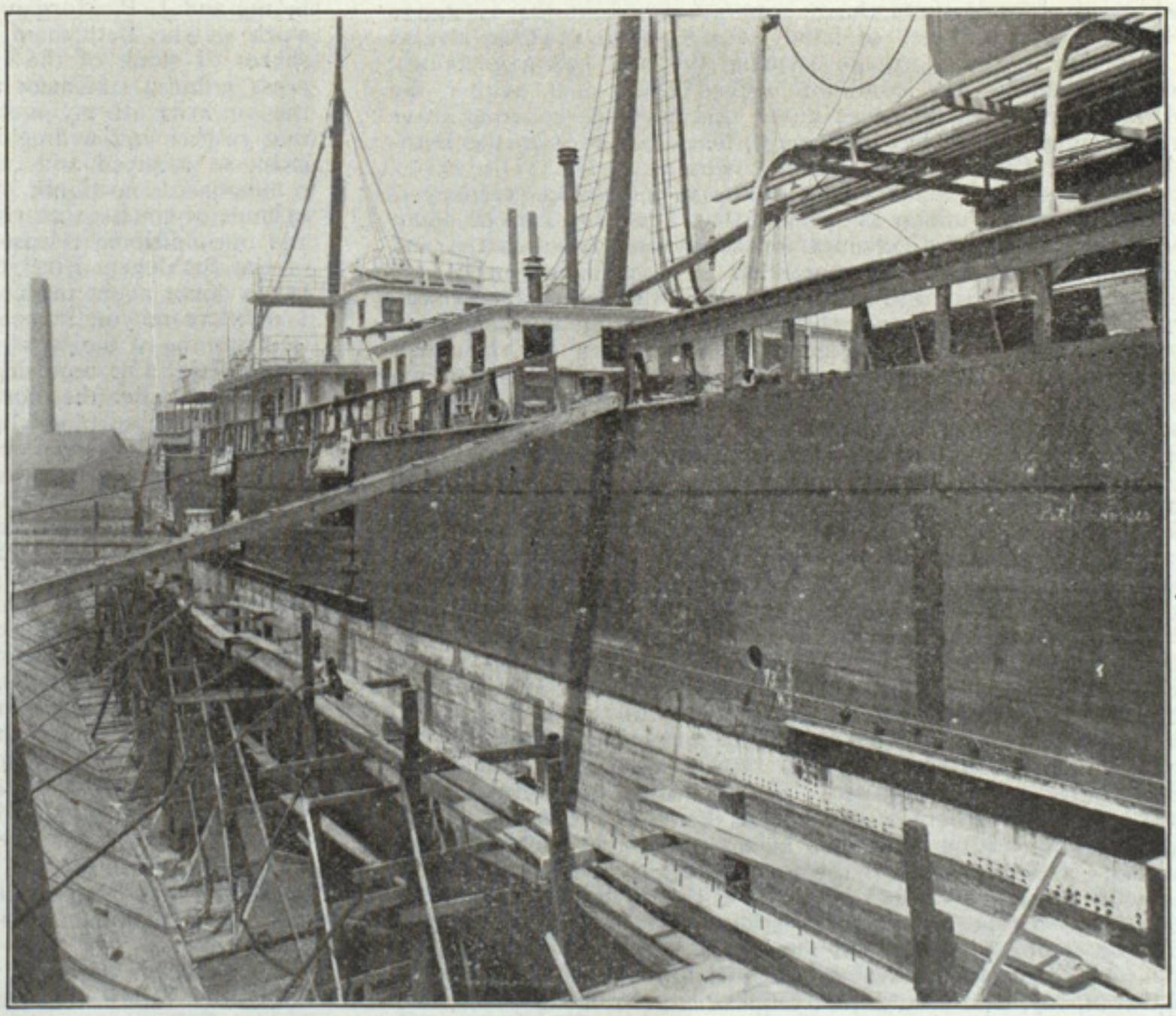
A well attended meeting of marine men was held in the arbitration room of the Chicago board of trade at noon Tuesday to take appropriate action on the death of Capt. Sinclair. Capt. D. Sullivan presided. A committee to prepare a suitable memorial, consisting of Capt. James A. Calbick, H. B. Ford and E. J. Henry, was appointed, which reported the following:

"In the death of Capt. James R. Sinclair, vessel owners and navigators of the great lakes have suffered a heavy loss. Beginning at the bottom of the ladder, Capt. Sinclair by his conscientious work, broad mind and even temper had attained a place in his chosen field where he stood without a rival. In all the complex dealings involved in the conduct of his business, we, his associates and patrons for over a score of years, have always found him considerate and just. We have always admired the steady-going temperament which he possessed. No complication of troubles in the navigation of Chicago river ever flurried him. And in all the transactions in business he quickly saw both sides of the questions at issue and at once sought the equity in all matters of dispute.

"While Capt. Sinclair might be termed the essence of good nature and jovial disposition, he was of a steadfast character and possessed in a large degree that firmness for which his race has ever been known. We sincerely deplore his death, coming at a time when he could look forward with confidence to the highest places in the field of usefulness where his life had been cast. In his death we feel the loss of a personal friend and a whole-souled companion. We extend to his widow and children our heartfelt sympathy in this their great loss."

FAVORABLE CROP PROSPECTS.

Duluth, Minn., June 17—Stocks of wheat in store at the head of the lakes are now 4,795,000 bu., including 1,620,000 bu. of wheat and 3,010,198 bu. of flaxseed. Wheat is unusually low, being nearly 4,000,000 bu. less than last year at this time and 3,500,000 bu. less than two years ago. There has been a decrease, all grains, of 350,000 bu. for the week. Receipts will probably be small for the balance of the year. Stocks at other Lake Superior points are also growing quite small and are expected to remain so till fall. In the meantime crop prospects throughout the region tributary to the head of the lakes and Canadian Lake Superior ports are so good that they leave nothing to be desired.



Lehigh Valley Liner Saranac under repairs in Chicago.

There has been talk that the diminished acreage in flax would make a smaller crop, but the growth conditions are such that it is quite generally expected among grain men that there will be sufficiently improved yield to make up for the lessened seeding, and that the crop will, after all, come very near to being a record yield.

Plans have been accepted by the Canadian Northern road for a new pair of grain elevators at Port Arthur. The two houses will be a working house of steel and timber with a capacity for 1,000,000 bu. and a tile storage in bins for 2,500,000 bu. more. Nothing is yet decided as to commencement of work, but it is generally understood that Barnett & Record will do the work and that the houses will be ready to receive grain some time during the coming winter. In this case work will begin soon. Possibly actual construction will be delayed as long as possible while the crop is growing, or until negotiations with the Grand Trunk Pacific are a little further along.

Additional machinery is to be installed at the yards of the Superior Ship Building Co., the first to go in being new and larger compressors and new and larger boilers. The berth vacated by the steamer Kerr has already been taken by another keel.

Testimony was taken at Duluth a few days ago on the part of W. P. Rend of Chicago, owner of the G. G. Hadley, to limit liability in the collision case in which the Hadley is involved. Page Morris, late congressman from this district, now federal judge, will open his first term of court here in July, and this will be one of his first cases.

The steamer M. A. Hanna recently took a load of 6,250 tons of coal into Torch lake, for the Calumet & Hecla Copper Co. It was by 1,000 tons the largest load ever taken in there and the Hanna was the biggest ship ever in the lake.

BUFFALO GOSSIP.

Buffalo, June 17.—It is speed in port rather than en route that the lake fleet aims at in these days, the distinction marking quite a radical change from the time when it was common to equip liners and even wild steamers as racers and watch their careerings up and down the lakes. Coal is too high for amusement of that sort now, and it always was if one stops to count the cost. So people rather wondered the other day to read that the New York Central liner Troy had broken a record on the run down from the Sault to the Lime-Kilns. The fact was, though, that no such time was made as reported and no effort was made to run fast. It was a case of what is now facetiously known as somebody indulging in an emission of hot air. The Troy's log shows that she was 27 hours and 15 minutes making that run, instead of a fraction over 23, as reported, and it is also found that she went up from the Lime-Kilns to the Sault in 26 hours and 40 minutes.

But this is merely an illustration. The lake manager cares much less for speed than he does for the waits in port that he is sure to meet unless he is very vigilant and efficient. It appears that the ore docks are giving the most trouble of late years, the complaint being that as cargoes grew larger handling apparatus and railway equipment did not increase, hence the inevitable result. Buffalo appears to be keeping up her former record as a fast handler of freight. There is certainly no falling off in speed at the grain elevators and some of the long-suffering lumber-barge owners have congratulated themselves of late over the despatch they are getting here.

It was in package freight that I set out to make a point, though. Local managers are making quite an exact science of this sort of transfer and, if anything, improving on former records. For instance the Buffalo of the New York Central Line discharged here lately 5,600 tons of flour in 12 hours and 50 minutes, and small cargoes of 2,000 tons go out in an afternoon. At the receiving docks on the upper lakes a cargo of 5,000 tons of flour is taken on in 24 hours. Where a cargo is to be discharged and another loaded here a large-size steamer does not have to remain in port more than about 17 working hours.

Of course nothing like this despatch is possible anywhere except on the lakes. The big ocean liners are especially slow in handling freight on account of it all having to go in and out overhead, as the phrase is, when only hatchways are used. Some of the coasters use gangways, but even then the shore facilities are not often what they might be. What is needed is plenty of space for stowage and some sort of conveyor from the boat to the warehouse floor level. It is said that the Mutual Line can handle a moderate-sized cargo here about as fast as any of them, as its conveyors run close down to the gangway, but for a large cargo some of the other warehouses are more capacious.

The process of reducing the time of a lake freight liner to almost the exactness of clockwork has been pretty nearly accomplished in late seasons, and it is of great advantage in keeping the liners from bunching up at one end or the other of the route. One manager states that he is now able to keep all of his steamers in place so exactly that his schedule is good for a matter of three months ahead and he usually runs from start to September without a break. There are occasional losses of time, but they are always made up again.

What is somewhat disturbing to the lake line managers is the fact that the western roads are to a certain extent imitating them. For a long time the freight service by rail has been growing slower and more uncertain, while the lake service was more and more exact. Ship flour by lake and its arrival at destination was known almost exactly. Ship it by rail and nobody could guess how long it would be on the way. The new idea is to make up solid trains beyond the lakes, say of flour in Minneapolis, and never break them up till they reach Buffalo and then send them on solid or nearly so into New England. The wire keeps everybody concerned informed of the progress of the train.

This sort of service by rail is bound to tell on the lake liner unless the differential is made more than 2 cents, or unless the old plan of free storage and free handling of flour in Buffalo is restored, which it is hardly expected to be. The lake service will always lead in capacity for moving freight in great quantity and prevent blockades, as the rail lines cannot afford to equip themselves for emergencies, so they let the surplus wait till they are ready for it.

JOHN CHAMBERLIN.

DEVELOPING NEW WATER POWER.

Duluth, Minn., June 17—Mr. F. H. Clergue, who is not now actively connected with the management of the "Clergue industries" at the Sault, is interesting himself in the development of water powers elsewhere on Lake Superior, and has closed negotiations for the purchase of rights that carry the immense power of Kakebeka falls, a few miles back of the Canadian head of the lake. This fall is immense and is very easily developed, giving for a comparatively small outlay a magnificent return. The growth and prospects of Port Arthur and Fort William, now that the Canadian northwest is opening so fast, will probably give this power ample use.

Great power at Duluth, in the 600-ft. fall of the St. Louis river, is being developed by the Great Northern Power Co. of this city. Actual work on the ground was begun this week with the construction of spur tracks from the main line of the Northern Pacific to the power house site. An immense amount of material will be laid down there in the coming twelve months. The company has closed contracts with the street railway company at Duluth-Superior for the delivery of 10,000 H. P. in a year from this date and is closing with other consumers. Messrs. Wolvin and McDougall of Duluth are among the directors and large stockholders in this company. Its plant will represent an investment of about $3,500,000. The bonds of the company will be underwritten in the west and will not be sold on the market for a long time yet. The company has so far expended much over $100,000 but has no interest bearing obligations out.

CONDITION OF THE SAULT INDUSTRIES.

It is reported from Sault Ste. Marie that the new $10,000,000 steel rail mill of the Consolidated Lake Superior Co. will be ready to begin operations on July 1. The temporary embarrassment which the company underwent several months ago has not interfered seriously with the development of its properties. In practically all cases in which the company was under contract to furnish steel rails and other products, the purchasers have made arrangements to accommodate the company with such extensions of time as it may require.

The annual consumption of steel rails in Canada is about 150,000 tons, and the Consolidated Lake Superior Co. aims to supply practically all of this. The full capacity of its plant will be sufficient to do this and there are no rail mills of importance in the Dominion. The tariff of $7 a ton on imported steel rails becomes effective on July 1. Heretofore Canada has been called the "dumping ground" for large quantities of cheap German and Belgian rails, but it is expected that these importations will cease entirely.

The Sault company is mining from 1,200 to 1,500 tons of iron ore from the Helen mine on the north shore of Lake Superior and is getting it out over its 45-mile connecting railroad. This ore is the best quality of hematite, grading only slightly lower than Bessemer. It is in great demand for mixture with the Mesabi ores, and the company has opportunities for disposing of much more than it is able to get out.

The company's fiscal year ends June 30. but its annual statement will not be completed until some weeks after that date. There is doubt whether the company will publish a report in detail this year. The directors have taken no action on the subject, and will not discuss it officially until later. A director of the company said a few days ago:

"The company is in excellent shape and is making very satisfactory progress in the development of its properties. None of its plans has been materially curtailed. The directors went over them thoroughly for the purpose of finding in what respects they should be altered or deferred, but came to the conclusion that as the execution of every one of them would mean immediately profitable business the company had better proceed as it began. The loan recently raised has provided the company with sufficient working capital, and there is no longer any question of its being able to finance all of its undertakings. The wood pulp and sulphide pulp mills are running to full capacity and disposing of their output on a favorable market."

The management at Buffalo of the Northern Steamship Co., which since the sale of its fleet of freight steamers operates only the large passenger steamers North West and North Land, is made up of Howard James, president, F. C. Cruger, manager, W. M. Lowrie, general passenger agent.

Capt. F. P. Houghton, master of the steamer James H. Hoyt, will take command of the steamer James H. Reed when she comes out the latter part of the month.

CARGO RECORDS OF LAKE FREIGHTERS.

The steamer Wm. Edenborn one of the "Big Four" of the lakes (Edenborn, Elwood, Hill and Gates) again possesses the distinction of having carried the largest cargo. It was loaded at Duluth on Fridav last and consisted of 7,729 tons gross or 8,656 tons of 2,000 lbs. Following are the cargo records to date:

Iron Ore—Steamer Wm. Edenborn, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,729 gross or 8,656 net tons, Duluth to Conneaut; steamer Isaac L. Ellwood, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,659 gross or 8,578 net tons, Duluth to Conneaut; steel tow barge John Smeaton, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,652 gross or 8,570 net tons, Two Harbors to South Chicago.

Grain—Steamer S. J. Murphy, Donora Mining Co., Duluth, 269,000 bushels of corn, equal to 7,532 net tons, South Chicago to Buffalo; steamer Douglas Houghton, Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 308,000 bushels of clipped oats and 60,000 bushels of corn, equal to 7,520 net tons, Manitowoc to Buffalo.

Coal—Steamer I. L. Elwood, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,688 net tons anthracite, Buffalo to Duluth; steamer John W. Gates, Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,659 net tons of bituminous, Lorain to Duluth.

CANADIAN SHIPPING NOTES.

Of the $3,000,000, which the Dominion government has agreed to loan the Montreal harbor commission, $2,368,000 is to be expended in providing steel sheds, elevated railways and other facilities on the Alexandria, King Edward and other piers. Between 1896 and 1901 parliament authorized the loan of $5,000,000 to the commission, of which about $1,250,000 is still available.

The steamer Empire State, owned by the Thousand Island Steamboat Co., was almost totally destroyed by fire at her wharf at Kingston, Ont., a few days ago. It is not likely she will be rebuilt. The loss is fully covered by insurance. The Empire State was originally the Sylvan Stream and was built at New York in 1863, her dimensions being: Length, 157 ft.; breadth, 26 ft.; tonnage, 379 gross. Her hailing port is Cape Vincent, N. Y.

The syndicate in which Capt. A. B. Wolvin is the leading spirit has purchased about 80 square miles of timber limits in Quebec. Pulp mills will be erected at Ste. Anne des Monts, which has a good harbor on the St. Lawrence. From these limits it is intended to provide freight for the company's steamers which bring grain from United States ports.

The Chignecto Marine Railway Co., a British company, expended $4,000,000 in constructing a ship railway to connect the Bay of Fundy with Northumberland strait, and thus shorten the distance between ports in southern New Brunswick and Prince Edward island, and other ports. The work was not completed and in 1896 the Dominion government refused the company's request for an extension of time. The company has been applying for some compensation, and the finance minister stated recently that something might be done as a matter of grace.

In renewing the subsidy to the Canadian Pacific Railway Pacific steamers for another five years the British postmaster-general expressed a hope that by the end of that time the Canadian government would have established a fast Atlantic line, and that there would be a quickened service on the Pacific. At the present time the service to China and Japan is of very little advantage as a mail service.

The Imperial Dry Dock Co. is asking the St. John, N. B., city council to provide a site on the mill pond, near Sand Point wharves for the dry dock. It is proposed to construct a wooden dock, 620 ft. long, with granite and concrete entrance, and to establish a repair plant in connection with the dock. The site asked for was granted by the council under the old agreement which expired in 1902. A committee will discuss terms with the promoters of the dock company.

Daily press reports have been in circulation to the effect that the Canadian Pacific Railway Atlantic steamers would discriminate against shipments by the Grand Trunk Railway at Montreal. The C. P. R. has issued a circular stating that its steamship lines will freely interchange business with all rail and water transportation lines reaching Montreal.

W. Petersen of Petersen, Tait & Co., Newcastle-on-Tyne, Eng., and now president of the Canadian Lakes & Ocean Navigation Co., is applying to the Dominion government for the return of the deposit of $50,000 made by his firm in 1897 on the occasion of the acceptance of its tender for a fast line. The attempt to float a company to provide the steamers was a failure.

It is understood that a representative of Lloyds will visit Canada during the summer for the purpose of inspecting the work being done in the way of improving the channel and providing additional aids to navigation between Montreal and the ocean.

The Halifax and Causo Steamship Co. has been organized with the following directorate: President, G. S. Campbell, Halifax; vice-president, A. N. Smith, Mosers River, N. S.; directors, A. M. Bell, W. S. Brookfield, J. E. DeWolf, Halifax; S. R. Griffin, Goldboro, N. S.; P. McConnell, Port Hilford, N. S.; secretary, W. S. Davidson.

P. F. Bowen & Co. of Quebec have been appointed agents there for the Montreal, Rochester & Quebec Transit Co.'s steamers, running between Quebec and Buffalo.

The Lake Superior Dry Dock Co. has been incorporated under the Ontario companies' act to construct dry docks and engage in ship building or repairing. R. H. Patterson, C. H. Hunter, T. Reid, R. G. Agnew, W. G. Frances and S. C. Wood of Toronto are tne provisional directors.

Capt. Charles Pye, it is understood, will be the general manager of the Canada Atlantic and Plant Line under the new owners.

AROUND THE GREAT LAKES.

Capt. W. H. McDonald, who sailed the lakes for 35 years, died at Milwaukee a few days ago. The death of Capt. Murdoch McRae, who commanded vessels for the Pere Marquette, the Goodrich, Ann Arbor and Crosby lines, is also reported from Milwaukee.

Col. Sumner I. Kimball, general superintendent of the life-saving service, visited Lorain this week in company with Capt. E. E. Chapman, superintendent of the tenth district, and Capt. C. A. Abbey of the United States revenue cutter service, and selected a site for a life-saving station.

John Sharpless is the name of the latest Wolvin canaler launched at the Superior yard of the American Ship Building Co. This is the sixth of the fleet of steamers that are to engage in the St. Lawrence trade this season. Of the remaining vessels one is building at Superior, one at South Chicago and two at Detroit.

Lake Michigan vessel men are much interested in the government's plans for making Portage lake a harbor of refuge. Portage lake is 8 miles north of Manistee and is one of the best harbors in the state of Michigan. It will require a year for the dredge recently sent from Chicago to cut away the 1,200 ft. of sand barring the entrance of large vessels into Portage lake. It will have a depth of 21 ft. when completed.

A bulletin from the weather bureau referring to the cable recently laid across the channel from Sleeping Bear point to South Manitou island, Lake Michigan, says: "Connection is made with outside points by a land line from Sleeping Bear point to Glen Haven. Daily wind forecasts will be sent to the displayman at South Manitou, and day and night warnings will be displaved from a steel tower that has been erected a short distance north of the lighthouse tower. These displays can be seen from any point in the harbor or by vessels passing the island bound in either direction. The displayman can be found at the station of the United States life-saving service. Vessels in distress, or wishing to be reported, should communicate with the displayman."

S. B. Cook, light keeper at Long Point lighthouse, Lake Erie, writes as follows via Port Rowan, Ont.: A body was found June 9 about a mile west of this station and on the north side of the point. Came ashore perhaps three or four days previous with the northeast wind. Buried it to help preserve it. Although somewhat bloated, a close companion could probably identify it. A man of perhaps fifty or more years, about 5 ft. 6 in. height and perhaps of 165 or 170 lbs. weight; large head and face; good teeth; about No. 7 shoes with loose patch on inside of right one; one white and one black sock; tweed pants with narrow stripe; common white undershirt; thin outer shirt with blue stripe; blue tie on neck; black vest found near body; no coat, no life preserver; nothing in pockets; no papers of any kind; one strap on back of suspenders gone and replaced by string to go over button.

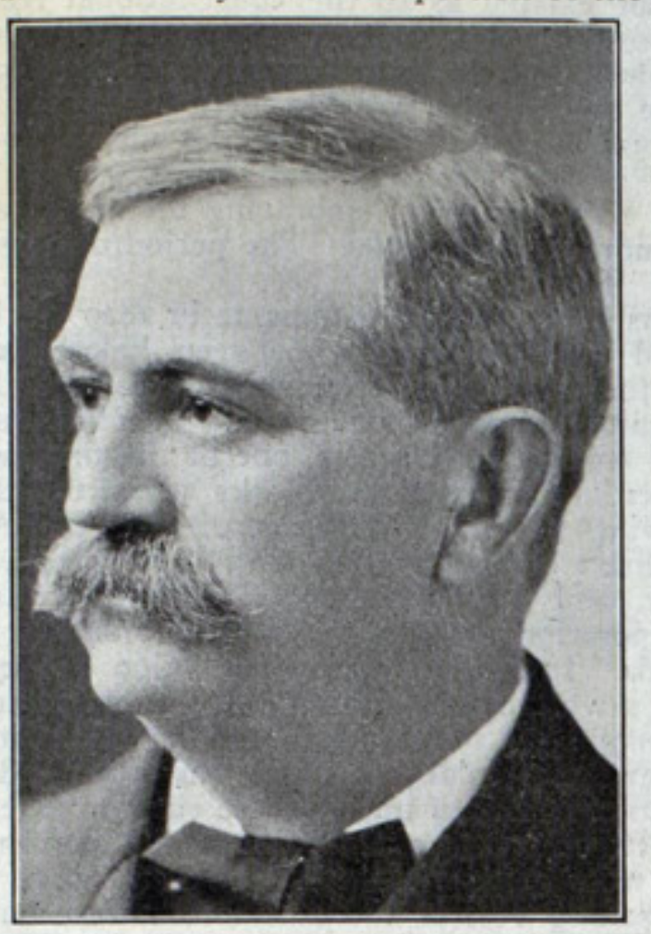
On Saturday last the little steamer Charles H. Davis, an old vessel heavily laden with stone from Kelley's island, foundered while trying to make the harbor of Cleveland. The trip had been a stormy one, but no serious difficulty was encountered until the steamer began to get the back wash from the breakwater. The seas which boarded her caused her cargo to shift, and while she signaled for help she sank before the harbor tugs could get to her. Both skill and heroism were exhibited by the captains of the tugs Frank W. and William Kennedy. Capt. Harry Coulter of the tug Frank W. is especially deserving of praise for having managed to pick off wreckage and out of the water in a very heavy sea all the crew except Capt. E. W. Haskins, who was also the owner of the steamer. He went down with the vessel. Those rescued were: James Haskins, first mate, Saginaw; Grace Kline, cook; Frank Yates and Frank Mehls, sailors; William and David Carrick, engineers of Cleveland; Frank Russel, sailor, of Bay City. The steamer was 145 ft. long and 31 ft. beam and had been engaged in the Lake Erie stone trade for several years.

The rivalry that developed last season between certain officers of the navy and the engineer corps of the army in the matter of locating and marking wrecks, new shoals, etc., has resulted in special activity on that score this season by the engineers in charge of lake districts. Of course this is welcomed by the vessel interests. Immediately following the sinking of the steamer C. H. Davis, off Cleveland harbor a few days ago, Maj. Dan C. Kingman of the Cleveland district located the wreck and marked it with a red and black buoy. The wreck is about 3,600 ft. northwest of the light on the west arm of the breakwater, with 25 ft. of water over it. Maj. Warren of the Milwaukee district has discovered a shoal spot, presumably rock, about 2 miles east, northeast of Wind point light station, above Racine, Wis. There is only 23 ft. of water at the spot, which is not more than 100 ft. long or wide, and which is surrounded by a larger reef over which there is 30 or 40 ft. of water. The engineer office at Duluth is endeavoring to locate the wreck of the tug Edward Gillen, sunk near the Superior entry on May 18 in collision with the steamer Mauna Loa. Owners of the tug, the Lake Superior Contracting & Dredging Co., are also trying to locate her and will probably raise her if she is found. She was valued at about $12,000.

DEVELOPMENT OF THE COMMERCE OF THE GREAT LAKES.

By ALFRED NOBLE, President American Society of Civil Engineers.

In such facts and conclusions as I may present regarding the "Development of the Commerce of the Great Lakes" I shall in the main confine myself to the portion of the great lakes system lying above Niagara falls, which forms a well-defined unit. In the light of more recent history, it seems at first surprising that so much time elapsed after the occupation of tropical America before serious attention was given to that part of the continent where the greatest development has since been made. In Spanish America a high degree of civilization for the time had been reached before the English had obtained a foothold in North America; and the French, as a civilized community, had little more than standing room along the margin of the St. Lawrence more than a century after the great achievement of Columbus. Much information concerning the areas immediately bordering the lake was given by the missionaries, who left admirable records; and some information of the regions further inland was obtained by the *coureurs-de-bois,* who made few records; but the Mississippi valley was practically unknown until nearly two centuries after Columbus, when La Salle undertook his heroic task. As a first step he became a shipbuilder. The launching, in 1679, of La Salle's schooner, the Griffin, a vessel of about 45 tons, marked the inauguration of modern navigation on the lakes above the falls of Niagara. A little hamlet, at the mouth of Cayuga creek, a short distance above the falls on the American side, bearing the name of the intrepid explorer, marks the site of the first ship yard on the shores of these waters.



Mr. Alfred Noble.

It was expected that the Griffin would serve to advance the exploration, not only by conveying La Salle and his party to Lake Michigan, but by engaging in the fur trade its profits would supply in large part the money needed to sustain his work. After landing on the shore of Green Bay, he loaded the vessel with furs and sent it on its way to the foot of Lake Erie. It was never again heard from. Whether it disappeared through the fury of storms, treachery of the savages or cupidity of its own crew, is one of the mysteries of these inland seas. This seems to have been the only attempt to place a modern craft on the lakes for many years. I have been able to find no record of any other vessels on Lake Erie until after the capture of Fort Niagara by the British in 1759, when they began at once to build vessels above the falls. (*a*) During the siege of Detroit by Pontiac, in 1763, two small vessels, the Gladwyn and the Beaver, lay at anchor in front of the post; thus it would appear that nearly another century had passed—or nearly three centuries after Columbus—before modern navigation was resumed on the lakes between the Falls of St. Mary and the Falls of Niagara. Such commerce as existed on the great lakes in those early days was mostly confined to the trade in furs, and converged at Montreal, the head of ship navigation on the St. Lawrence. This was carried on the lakes mainly in canoes and craft 30 to 50 ft. long, propelled by paddles, called barges by the English and *bateaux* by the French.

From such meager records as are at hand it seems probable that, after the unfortunate Griffin, sail navigation had an earlier development on Lake Superior than on Lake Erie. It appears, indeed, that a Frenchman named La Ronde built a bark of 40 tons above the St. Mary's falls or rapids about 1731, the rigging and other materials being sent from Lower Canada in canoes. (*b*) It is stated by Captain Jonathan Carver, who traversed Lake Superior in 1766, that the French, "while in possession of Canada, kept a small schooner on this lake." The loss of this vessel is reported soon after the conquest of Canada by the British. (*b*) The discovery of copper led to the building of a sloop of 70 tons, above the St. Mary's falls, which was launched in 1772. It was used in prosecuting mining enterprises until their collapse a year or two later, when it probably passed into the hands of the fur traders who from this time monopolized the commerce of Lake Superior for many years. (*b*)

REMARKABLE COMMERCIAL ORGANIZATIONS IN THE FUR TRADE.

The early history of lake commerce could not be understood without a reference to the remarkable commercial organizations which were formed mainly for the trade in furs. The first and most important was the Hudson Bay Co., which was chartered by Charles II in 1670 under the name of "The Governor and Company of Adventurers of England Trading Into Hudson Bay." It had the exclusive right to trade in and govern all the territory draining into Hudson bay. For more than a century it exercised these privileges without opposition, except as operations brought its agents in contact with the French, then in control of the basin of the great lakes. Soon after this territory passed under British control, in 1763, the superior advantages of the Lake Superior route to the region northwest of it became manifest. In 1783, the year when the independence of the United States was acknowledged by treaty, the Northwest Co. was organized at Montreal, and at once became a vigorous competitor of the older company, extending its operations across the continent. Its success stimulated the formation of other companies, among others the American Fur Co., a pseudonym for John Jacob Astor. The interests of the British side of the boundary were practically unified in 1821 by the amalgamation of the Hudson Bay and Northwest companies under the name of the former. About 1870 the company gave up its power to govern vast territory over which it had so long held absolute sway, and became a purely commercial organization. Its business is said to be greater now than ever before.

The Northwest Co. employed sailing vessels soon after it was organized, and before the end of the eighteenth century had at least one on Lake Superior and one on Lake Huron. At the beginning of the war of 1812 the company reported to the Canadian government that they would place at its disposal on Lake Superior one vessel of 120 tons which could carry six or eight guns, and another of 60 tons. These and three others were captured by the Americans; and another, cleverly hidden in an obscure harbor at the east end of Isle Royale, escaped detection, and after the close of the war was run down the St. Mary's rapids for service on Lake Erie. (*b*)

The year after the war closed, congress passed an act prohibiting British fur traders from prosecuting their enterprises within the territory of the United States. This gave the American Fur Co. its opportunity, and, before many years had elapsed, it had sailing vessels both above and below the St. Mary's rapids. It is not certain that the British companies again placed sailing vessels on Lake Superior. The British, however, were not entirely driven from the lake. They had a schooner in service in 1822 and 1823, in which Lieut. Bayfield of the royal navy made a survey of the lake. Considering the time consumed and the means at hand it was wonderfully well done. The shore line and depth of water, islands and sunken rocks, were represented with surprising accuracy and detail, and Bayfield's charts remained standard for fifty years.

While the British had sailing vessels on Lake Erie in 1759, and probably continuously thereafter, no American vessel was built above the Falls of Niagara until 1797, when the schooner Washington was launched at Erie. It was sold the following year to a Canadian, and carried on wheels around the falls to Lake Ontario. (*c*) There were no other American vessels on Lake Erie for some years, but, at the outbreak of the war with Great Britain, several small ones were found in service on both sides of the boundary, and formed parts of the hostile fleets. The larger vessels of Perry's fleet were built at Erie in 1813. It is said that they were built from standing timber in seventy days. The famous battle of Lake Erie, fought on Sept. 13, 1813, gave the Americans supremacy on these waters, and it has been maintained ever since. It is worth noting that the aggregate tonnage of the two fleets in this celebrated battle was less than that of a modern lake freighter of moderate size.

After the war, the tide of emigration set strongly to the territory bordering on the lakes. Sailing vessels multiplied, and in 1818 the first steamboat above Niagara falls was launched at Black Rock, now a part of Buffalo, then the principal Lake Erie port, and on Aug. 25 started on its first trip to Detroit. With great propriety, it was named Walk-in-the-Water, for it appears to have been capable of no more rapid pace. From nine to ten days were required for a round trip. The port of Black Rock was on the Niagara river, below the rapid current, at the outlet of the lake. Unassisted, the Walk-in-the-Water could not stem the current and was regularly assisted, when starting on its westward trip, by what was called a "horned breeze," several yoke of oxen being attached to the boat and hauling it to the lake. (*c*)

An event was now approaching which was to have immediate and far-reaching industrial results. This was the opening of the Erie canal, giving convenient access to the lake region and an outlet for its agricultural products. It appears probable that a canal to connect Lake Erie directly with the Hudson river was first proposed by Gouverneur Morris in 1803, but the suggestion was considered "the effusion of an eccentric mind indulging in romantic and visionary schemes." Within four or five years its merits became more generally perceived, and in April, 1808, an act of the legislature of New York authorized a survey of the route, and appropriated for it the magnificent sum of $600. Mr. James Geddes was appointed the first engineer, made the survey

(*a*) "The Commerce and Shipping of the Great Lakes," a special report by Mr. C. H. Keep of Buffalo.

(*b*) Dr. James D. Butler in a paper for the Michigan State Historical Society on early shipping on Lake Superior.

(*c*) Keep.

and submitted his report early in the following January. It did not include an estimate of cost, but this was supplied two years later by a state commission as $5,000,000. A loan of the amount was authorized by the legislature, but the act was subsequently repealed. The commission referred to was composed of some of the most eminent citizens of the state. After submitting its report, with the estimate above noted, its membership was increased, and a second report was made in 1812. From this time, for several years, nothing decisive was done, but the sentiment in favor of the project was gathering strength, and in 1816 a board of canal commissioners was appointed, who employed engineers, fixed the dimensions of the prism and locks and inaugurated the work, breaking ground at Rome, July 4, 1817. The president of the board was De Witt Clinton, the most powerful and persistent advocate of the project. (*d*) A few months before the inauguration of the work at Rome, a joint committee of the legislature reported that the cost of transportation from Buffalo to Montreal was $30 per ton, and the returning transportation from $60 to $75. The expense of transportation from Buffalo to New York was stated at $100 per ton, and the length of passage twenty days. In 1852 Mr. Israel P. Andrews, in a striking "Report on the Trade and Commerce of the British North American Colonies and upon the Trade of the Great Lakes and Rivers," commented on these rates in the following forcible words: "Upon the very route through which the heaviest and cheapest products of the west are now sent to market, the cost of transportation equalled nearly *three* times the market value of wheat in New York; *six* times the value of corn; *twelve* times the value of oats; and far exceeded the value of most kinds of cured provisions."

ERIE CANAL A GREAT FACTOR IN DEVELOPMENT OF NORTHWEST.

These comparisons show how absolutely impossible the development of the northwest would have been at that time without the cheaper transportation afforded by the canals. Among the most effective reasons given for the building of the Erie canal was the need of counterbalancing the advantages of the natural route down the St. Lawrence. In a memorial, presented to the legislature in 1816, commenting on the route proposed by way of Lake Ontario, it was said: "The most serious objection against the Ontario route is, that it would inevitably enrich the territory of a foreign power at the expense of the United States." Indeed, the battle between the northwest and New York, the one contending for the cheapest outlet to the seaboard, the other for a waterway through its own territory and for the development of its own wealth, was fairly joined at that early day. With the Erie canal, victory was secured for the Empire State, and the supremacy of the port of New York established for at least a century. These consequences followed from a ditch that at the present time seems insignificant. The bottom width was 28 ft., at the water surface 40 ft. Its depth was 4 ft. The locks were 90 ft. long and 12 ft. wide. The magnitude of the canal is well set forth in a record of time: "Three Irishmen finished three rods of canal, 4-ft. cutting, in 5½ days." It was opened through to Lake Erie on Oct. 26, 1825, and navigated by boats of 35 to 45 tons. It had cost about $7,000,000.

The building of the Erie canal stimulated the spirit of enterprise in neighboring states, and in 1825 Ohio began a canal system, connecting Lake Erie with the Ohio river and by branches with various points within the state. The main lines were completed in 1832. The system attained a total length of nearly 900 miles, and in 1852 the total cost had amounted to more than $15,000,000. The width at bottom of these canals was 40 ft., and their depth 4 ft., the same as the Erie canal. In 1826 Pennsylvania inaugurated the great Pennsylvania line of improvement—part railroad, part canal—extending from Philadelphia to Pittsburg, with branches connecting with Lake Erie via Ohio canals and directly with Lake Erie at Erie. (*e*) The Wabash & Erie canal, by which the interior of Indiana was brought into water communication with Lake Erie at Toledo, gave an outlet to the corn crop on which Northern Indiana depended and made Toledo for many years the chief shipping point of this staple. It was 60 ft. wide and 4 ft. deep, east of Fort Wayne, and 40 ft. by 3 ft. westward. (*e*) A water communication between Lake Michigan and the Mississippi was advocated from a very early day; the Illinois & Michigan canal was commenced in 1836, and opened in 1848, with a channel 60 ft. wide and 6 ft. deep, and provided for boats of 150 tons. Its summit level was only 8 ft. above Lake Michigan. (*e*) A second line of communication between these waters was begun in 1848, to connect the Fox and Wisconsin rivers, the former discharging through Green bay into Lake Michigan, the latter into the Mississippi, with headwaters two miles apart. None of these canals connecting the great lakes with tributary districts is now an important factor in lake commerce. Some have been sold, others have been retained in use, but with diminishing traffic and a constant expense to the communities owning them.

As the opening of the Erie canal drew near, the improvement of lake harbors became most urgent. Buffalo was soon to take first place as the terminus of the canal. A survey of the harbor was made by the state engineers in 1819, but it was perhaps due to the prominence given the neighboring harbor of Erie, in the war then just passed, by the building of Perry's fleet, that the latter was the first lake harbor to receive an appropriation from the general government. By act of congress approved March 3, 1823, an appropriation of $150 was made for a survey of the harbor of Erie, which was carried out under the direction of the corps of engineers of the army, and plans for the improvement were presented by a board of engineers on Oct. 4 following. By act of congress approved May 26, 1824, the sum of $20,000 was appropriated for the work, and operations were commenced the same year. This appears to be the earliest appropriation made by the general government for harbor improvements. Much doubt existed as to the constitutional right of congress thus to dispose of public money. Appropriations for other harbors soon followed, but the entire amount for the lakes above the falls up to the end of 1829 was less than $250,000. In the next decade the total was $1,250,000; in the next, about $400,000; in the decade of the '50's, less than $500,000, and in the period from 1860 to 1865, inclusive, embracing the civil war, the total was but little more than $500,000. The period of larger appropriations began in 1866.

Another impetus was given to lake commerce in 1829 by the opening of the Welland canal in Canada between Lakes Erie and Ontario, by which the obstruction to navigation toward the sea by the Falls of Niagara was at last overcome. The first vessels through it ascended from Lake Ontario, one of the first two being of 85 tons burthen. The canal and locks permitted the passage of vessels drawing 7½ ft., with beam of 21½ ft. An extension giving more direct communication with Lake Erie was commenced immediately, and opened in 1833. The work had been executed by a corporation assisted by the governments of Upper and Lower Canada. Immediately after the union of these provinces, in 1841, the government acquired all the stock and took up the task of completing the canal system to tide-water at Montreal. The Welland was enlarged, and at the end of 1848 the St. Lawrence navigation had been improved to such an extent that vessels drawing 9 ft. of water could pass from Lake Erie to the sea. The locks were generally 150 ft. long and 26½ ft. wide. (*f*) Numerous sailing vessels and steamboats were built whose dimensions were fixed by these lock dimensions. When I first became acquainted with lake commerce, in 1870, a large share of the vessel tonnage consisted of so-called "canal vessels" built to run between ports on Lake Ontario and the upper lakes. These were mostly sailing vessels, but there were also many steamboats, a single line having about thirty in constant service. Some of the sailing vessels are still in use. It is beyond the scope of this address to make more than a reference to the magnificent system of waterways by which, as now developed, vessels drawing 14 ft. can pass from the great lakes to tide-water at Montreal. On this development the government of Canada has expended $67,000,000, a far greater amount in proportion to its resources than the government of the United States has expended on all its waterways.

It was evident very soon after the opening of the Erie canal that it must be enlarged, and only ten years after the enlargement was commenced. Its execution required twenty-seven years, and was completed in 1862, giving a prism 56 ft. wide on the bottom and 7 ft. deep, with locks 110 ft. long and 18 ft. wide, allowing the passage of boats carrying 240 tons of freight. The enlargement had cost $32,000,000. In 1895 a further enlargement, giving 8 ft. over the miter sills and 9 ft. in the prism, was inaugurated, but suspended because of the unexpectedly great cost.

EFFECT OF ERIE CANAL ON LAKE COMMERCE WAS IMMEDIATE.

The effect of the opening of the Erie canal on lake commerce was immediate; in fact, as the completion of the waterway drew near, its advantages were to some extent anticipated. "In 1816 the whole tonnage of the lake vessels at all the Lake Erie ports, including Detroit, was 2,067 tons. The vessels ranged from 10 to 99 tons, except two, which were 102 and 134 tons, respectively. In 1819 there were registered in the customs district of Buffalo Creek seven vessels, with a total tonnage of 473 tons, but of these seven vessels one was a steamer (none other than the redoubtable Walk-in-the-Water.") (*g*)

The increase in shipping from this time forward was too rapid to be followed in detail here. The growth during the next few decades is summarized by Andrews as follows: In 1825, the year of the opening of the Erie canal, the tonnage above Niagara falls consisted of three steamers of 772 tons, and fifty-four sailing craft of 1,677 tons, making a total of 2,449 tons; in 1830 this had increased to 16.300 tons; in 1835, to 30,602 tons; in 1841, to 55,181 tons; in 1846, to 90,000 tons; in 1851, to 153,426 tons; and in 1862, to 383,309 tons; but this latter includes, according to Mr. Keep, the tonnage below the Falls of Niagara.

The dimensions of vessels had also increased rapidly. In 1839 the twenty-five largest steamers had an average burthen of 449 tons, the largest one being 800 tons. In 1851 the average of the twenty-five largest was nearly 1,000 tons, and of the whole steam fleet of 157 vessels, 437 tons. The most remarkable feature of the period from 1840 to 1860 was the development and decline of the passenger traffic. A number of boats engaged in this traffic were of 1,000 tons and upward. The Western Metropolis, owned and operated by the Michigan Southern & Northern Indiana Railroad Co., was 340 ft. long, and was run

(*d*) Data relating to the early history of the Erie canal have been extracted mainly from a "Documentary Sketch of the New York State Canals" by S. H. Sweet, deputy state engineer and surveyor, 1862.

(*e*) Andrews.

(*f*) Data regarding the Welland canal and the St. Lawrence canals are obtained from "General Report of the Commissioner of Public Works" of Canada for 1867.

(*g*) Keep.

regularly at 19 miles per hour. Its route was between Buffalo and Toledo, the Lake Shore railroad not having been completed. On the opening of that road, affording an outlet for the Michigan Southern & Northern Indiana, and the opening of the Great Western of Canada, giving the Michigan Central an outlet, the passenger traffic quickly declined, the engines were removed from several steamers, and the hulls converted into sailing vessels, and in some cases into dry docks. It was not until very recent years that these steamers were equalled on the lakes, either in dimensions, speed or elegance of equipment.

Up to 1836 the direction of grain shipments through the Straits of Mackinaw was toward the west. In that year the first cargo of grain from Lake Michigan was received at Buffalo, and by 1840 this traffic had become securely established. Chicago quickly took first place as a shipping point, its shipments increasing from 10,000 bu. in 1840 to upward of 28,000,000 in 1860. The present grain movement of the lakes is about 200,000,000 bu. annually. In recent years, however, this movement, once the largest item in lake commerce, has taken a place second in importance to iron ore from the Lake Superior ranges.

It is not generally known that canal communication was opened between Lake Superior and Lake Huron many years before the Erie canal gave an outlet to Lake Erie. In fact, it was long forgotten that such a channel had ever existed. A few years ago, Judge Joseph H. Steere of Sault Ste. Marie, a gentleman whose recreation has consisted largely of study of the history of former conditions in the Lake Superior region, found in some old records a mention of a canal and lock formerly existing on the Canadian side of the St. Mary's river at the rapids. He called to his aid his fellow townsman, E. S. Wheeler, and they made jointly a search and were rewarded by finding the remains of this the earliest of the artificial waterways about the great lakes. It was built by the Northwest Co. about 1798, to facilitate the passage of *bateaux* engaged in the fur trade. Many canoes and sailing vessels have been run over the rapids since the white man first appeared on these waters, and the lives of passengers and crews cheerfully risked, but the consigning of valuable furs to such hazards was a more serious matter. The lock was 38 ft. long, 8 ft. 9 ins. wide, with a lift of 9 ft., which was about one-half the total fall at the rapids. The canoes and *bateaux* were assisted over the remainder by oxen. The lock served its purpose for several years, but was finally destroyed by the Americans in 1814, during the war with Great Britain. A public-spirited resident of Sault Ste. Marie, Canada, has partially restored it, and gives it sympathetic care.

EARLY FISHERIES AND DISCOVERY OF COPPER.

Soon after the full tide of immigration set in to the lake region the lake fisheries assumed prominence. Very soon the resources of Lake Superior in this direction attracted attention, and better communication with the lower lakes was demanded. The St. Mary's rapids, with a fall of about 18 ft. in a distance of less than a mile, formed the only serious obstruction for the vessels of the time, and attention had been called to the necessity of a ship-canal around the rapids by the first governor of the state of Michigan, in his message to the first legislature of the state, in 1837. The legislature authorized a survey and appropriated $25,000 to cover the expense. The survey was made the same year, and plans prepared for a canal 75 ft. wide and 10 ft. deep, with locks 100 ft. long and 34 ft. wide. These dimensions were greater than had been adopted for any other canal in the country. The cost was estimated at $112,544. Financial difficulties prevented the state from undertaking the work, and congress was repeatedly but vainly besought to undertake it. In 1840 a bill was before congress granting the state 100,000 acres of land to aid in the construction of such a canal. It was advocated mainly on the ground that it "would stimulate the fisheries of Lake Superior, estimated to be worth $1,000,000 per annum"; and, it was incidentally added, "in the country bordering the southern shore of Lake Superior copper ore and other minerals are believed to exist in abundance." While the bill was before the senate, "Mr. Clay of Kentucky took occasion to speak of the work as beyond the range of the remotest settlements in the United States, or in the moon." Possibly the great senator, in preventing the inauguration of the work on a ridiculously inadequate scale, performed not the least of his many public services. The existence of copper in the country adjacent to Lake Superior was known from a very early day, and was mentioned by Lagarde in a book published in Paris in 1636. (*h*) Other references soon followed. A more detailed account was given by Charlevoix in the report of his journey made in 1721. Capt. Jonathan Carver, whose voyage in 1766 has been mentioned, stated: "The Ontonagon river is remarkable for the abundance of virgin copper on and near its banks, a metal which is met with also in several places on the coast. I observed that many of the small islands, particularly those on the eastern shores, were covered with copper ore. * * * * His book was, justly perhaps, regarded by many as a second edition of 'Gulliver's Travels,' and subsequent explorations failed to confirm the truth of many of his statements, which appear to have been merely the creations of a vivid imagination."

Another traveler, Alexander Henry, reported that he saw copper on the banks of the Ontonagon river in 1765, and on a second trip to the same locality, cut off from a large mass with an axe a portion said to weigh 100 lbs. A company was formed soon after, of which Henry was a leading member, to prosecute copper mining, a sloop built, as already stated, and miners sent to the site of the supposed mine. After one or two years of struggle at this site and at others. the enterprise was abandoned and little was heard of the mineral wealth of the Lake Superior region for sixty years or more.

One of the earliest measures taken by Michigan, after its admission to the union, was to provide for a geological survey. The work was placed in the hands of Dr. Douglass Houghton, one of the leading geologists of his time. He had already, in 1830 and 1831, visited the site of Henry's mine on the Ontonagon river, and again did so in 1840 while making his first geological survey. His reports "cleared up the mists of tradition, and attracted the attention of the people of the United States and of Europe to the new mineral fields." (*h*) In 1845 he fell a victim to the fury of the lake. His work resulted in the organization of numerous companies for mining copper. The first miners to visit the region after Henry's party in the previous century went up the Ontonagon river in 1846 to remove the copper rock, which they succeeded in doing and selling. It had been removed from government land without license, and therefore was seized and taken to Washington where it is believed to still remain. During the same year mining under proper licenses was commenced at several sites, and the mining interests became at once a more potent influence than the fisheries, for better communication with the lower lakes.

It would be difficult to determine now whether copper or iron was the more powerful factor in securing such improved communication. Rumors of the existence of iron ore had been heard before its discovery by white men. They were placed on an authoritative basis by William A. Burt, deputy United States land surveyor, the inventor of the solar compass. In September, 1844, he was engaged with a party in making land surveys for the United States government in the region since known as the Marquette district. They began to notice remarkable variations of the magnetic needle which changed rapidly as they moved from place to place. Finally they came to a place where the north end of the needle pointed south of west, and all hands stopped work and looked about for the cause; soon they had collected from outcrops numerous specimens of iron ore. The first iron mine in the district was located the following year, and in 1846 the first iron from Lake Superior ore was made in a blacksmith's forge. The first shipment of ore from Lake Superior was made in 1850 and consisted of five tons. No great development could be made without continuous navigation to the lower lakes; yet the impulse for better communications had resulted in navigation on Lake Superior itself on what may be considered a commercial scale. A notable event had occurred in 1839, when the Algonquin, a schooner of 50 tons, was hauled overland past the rapids and launched in Lake Superior. The development of copper mining furnished the impulse for repeating the feat, and several sailing vessels made the transit in 1845. In the same year the propeller Independence, 280 tons, was hauled over, and other steamboats followed; small sailing vessels could not compete with them advantageously, and several were run over the rapids to end their days in the lower lakes. In 1852 two steamers and four propellers were reported as employed on Lake Superior. Goods arriving at Sault Ste. Marie from either direction were unloaded, transferred by teams and wagons or by tram cars past the rapids and reloaded on vessels. The cost of this was too great to be borne by any but valuable articles, and while copper could bear the expense the shipment of iron ore was impracticable. In 1850 the total shipments across the portage were 6,000 tons. These were largely increased during the next four years immediately preceding the opening of the St. Mary's Falls canal.

CONSTRUCTION OF THE STATE CANAL.

As often the case in later days when a project of harbor or river improvement of questionable merit is pressed in congress, a survey of the proposed St. Mary's Falls canal was ordered, while an appropriation for the project itself was refused. From this resulted a better understanding of the commercial requirements and of the probable cost, and in 1852 congress granted to Michigan 750,000 acres of public land, requiring that the canal should be at least 100 ft. wide and 12 ft. deep, with locks at least 250 ft. long and 60 ft. wide. The lock dimensions were wisely increased to 350 by 70 ft. before construction began, there being two lifts of 9 ft. each. These dimensions were greater than in any other artificial waterway on the continent, if not in the world. Congress allowed three years for beginning the work and ten years for completion. The state at once made arrangements with a corporation known as the St. Mary's Falls Ship Canal Co. for building the canal for the land grant. The undertaking was, for the times, stupendous. The locality was almost as uncivilized, the resources of the surrounding country were almost as undeveloped, as when white men first set eyes upon it two centuries before; but the work was in the hands of able men, and notwithstanding the isolation of the place, and at the outset, the utter lack of labor, machine-shops and all other facilities, and notwithstanding an outbreak of cholera which decimated the force, the work was executed in two years, and opened to commerce on June 18, 1855. The period allowed by congress for beginning sufficed for its triumphant completion. Its cost to the constructing company had been, in round numbers, $1,000,000. An amount of land equal to that granted by congress could have been bought at the lawful rates for less money, but the ship canal company had the valuable privilege of selecting lands not yet thrown upon

(*h*) See "History and Review of the Copper, Iron, Silver, Slate and Other Material Interests of the South Shore of Lake Superior," by A. P. Swineford, Marquette, Mich., 1876.

the market, and this privilege they exercised with great wisdom and great good fortune. A notable example was the site of the famous Calumet & Hecla copper mine.

The building of the canal marked a stage in the development of lake commerce hardly less important than the opening of the Erie canal, thirty years before; not only because of the traffic through it, which, indeed, increased slowly, for the country about Lake Superior was still a wilderness and there were no great wheatfields beyond it, but because it fixed for many years the depths to be obtained in the harbors and in the channels connecting the lakes, and consequently to a large extent the dimensions of vessels and the cost of transportation. The depth of water in but few of the lake harbors was as much as 12 ft., while in the channels connecting the lakes there were serious obstructions. In the St. Mary's river a channel several miles long had to be dredged before the limited commerce to and from Lake Superior could make use of the full draught provided at the canal; while the St. Clair flats interposed a like obstacle to the far greater commerce passing there. The civil war soon absorbed the energy of the country, and other interests were secondary. At the close of the war the principal articles transported by water were grain and lumber. The receipts of grain and flour at Buffalo in 1866 were about 1,500,000 tons; the receipts of lumber at Chicago alone were about 1,400,000 tons by lake, while the iron ore shipments at all lake ports were less than 300,000 tons, and the coal tonnage but a little greater than that of iron ore. A more liberal policy toward internal improvements was then adopted by the general government, and projects for harbor and channel depths of 12 ft. were prepared and soon executed. This depth sufficed for only a few years. By 1870, or soon after, vessels drawing 13 ft. and upward could enter a few of the more important ports, such as Buffalo, Cleveland and Chicago, and a demand for a depth of 16 ft. became general. The initiative was again taken at the St. Mary's Falls canal by a project for increasing the depth from 12 to 16 ft. and building a new lock, 515 ft. long and 80 ft. wide, overcoming the entire difference of level of about 18 ft. by a single lift. These dimensions were unprecedented in canal construction. A distinguished professional visitor from the other side of the boundary declared, with something like indignation, that this was not a canal lock but a basin. The Welland canal was then being enlarged, with locks 270 by 45 ft. and about 14 ft. lift. The lift of 18 ft. was almost universally criticised as unprecedented and injudicious. The improvement begun in 1870 was completed in 1881, at a cost of $2,200,000, but before the increased depth could be made fully available, the St. Mary's river had to be deepened in numerous places, the St. Clair Flats canal dredged and a cut made through a reef of rock near the mouth of the Detroit river. The last-named improvement was noteworthy by reason of the methods adopted for sub-aqueous rock excavation. The cost of the excavation had been estimated by a board of engineers at $30 per cubic yard, but the ingenious devices and methods of a single contract resulted in a lowering of prices to $7. Similar work has since been carried out at one-third of this figure with large profit.

The 16-ft. channel was completed in 1884. In the meantime the principal harbors were put in readiness and a fleet of large vessels was built to take full advantage of the new facilities. The growth of traffic has been notable. The average annual receipts of grain at Buffalo had increased above 50 per cent. The shipment of coal by lake at the beginning of the period was almost nil; at the end it was 3,000,000 or 4,000,000 tons, or more than half the entire Suez canal traffic. Iron ore shipments had increased from 300,000 tons in 1866 to 2,300,000 tons in 1884. The number of vessels on the lakes had increased but slightly, but the gross tonnage had increased about 50 per cent. Freight rates had fallen remarkably; on iron ore from Lake Superior to Lake Erie ports they had fallen from $3 to $1.35 in gold per ton, and on wheat from Chicago to Buffalo from 9 to 2¼ cents per bushel. The net registered tonnage through the St. Mary's Falls canal had increased 440 per cent.

EXTENT OF IMPROVEMENT IN CONNECTING WATERWAYS.

Before the project for a 16-ft. navigation had been fully carried out it was clearly seen to be inadequate, and measures were taken for increasing it. Largely through the foresight of a member of the American Society of Civil Engineers, Gen. Orlando M. Poe, now deceased, then in charge of harbor and river improvements between Lake Erie and Lake Superior, the new work was undertaken on a liberal scale. A depth of 19 to 21 ft. is now found in the principal harbors and in the connecting channels between the lakes. A new channel was opened through the system of small lakes and straits known as the St. Mary's river, saving 11 miles in distance, and practicable for night navigation. The extent of the improvements in the connecting channels is much greater than generally realized. Between Lakes Superior and Huron the aggregate length of new or deepened channels is 20.3 miles, and between Lakes Huron and Erie 21.2 miles. The commerce between Lake Superior and Lake Erie, aggregating 25,000,000 to 30,000,000 tons per year, passes through all of these, a total of 41.5 miles of artificial waterway. This is 5 miles greater than the length of restricted waterway to be made at the Panama canal. The width of the lake channels, however, is greater than now proposed for the inter-oceanic canal, varying from 300 to 1,000 ft., excluding a distance of about a mile at the St. Mary's Falls canal, where the minimum width is about 115 ft., and a mile at the foot of Lake Huron, where the width is 2,400 ft. These improvements included the deepening of the St. Mary's Falls canal to 25 ft., and the building of a new lock, 800 ft. long and 100 ft. wide, with 20 to 22 ft. over the miter-sills, located on the site occupied first by the old state locks. It was opened to navigation in 1896. The cost of the canal improvement was $3,800,000. This is the largest lock in existence, and like its predecessor at the same place was intended to pass three or four of the largest vessels at once. As in the previous cases, this expectation was not realized by reason of the rapid growth of ship dimensions. While this lock was building, the Canadian government decided to have a canal on their own side of the river, and built it at a cost of $4,000,000. The canal and locks give a depth of 22 ft. The locks are 900 ft. long and 60 ft. wide. It was opened to navigation in 1895. The lockage facilities at the St. Mary's rapids now comprise three independent locks, each overcoming the entire difference of level at the rapids, and each equipped with hydraulic or electrical machinery for all operations. The last built American lock, opened in 1896, passes about 70 per cent. of the entire amount of commerce entering and leaving Lake Superior.

The amount of commerce passing through these improved waterways almost challenges belief. The Detroit river undoubtedly carries more tonnage than any other navigated channel in the world, the freight tonnage being estimated at 40,000,000 to 50,000,000 per year. St. Mary's river, with its freight tonnage of nearly 36,000,000 in 1902, may be the second. Of the leading articles transported, grain receipts at Buffalo increased nearly 300 per cent. from 1884 to 1898, the receipts there in the year last named being nearly 270,000,000 bushels (*i*) or about 7,000,000 tons. The coal movement is somewhat greater, while the movement of iron ore is three or four times as much as either.

Several lessons of importance in the design of ship canals are taught by experience with these waterways, which are peculiarly applicable to the project for an isthmian canal. One of these lessons is that a very large traffic can be carried through a canal with locks. During the navigation season of 1894, embracing 234 days, a tonnage of 16,800,000 tons, net register, was passed through a single lock, the vessels averaging less than 940 tons each. During the last season, of 264 days, the net registered tonnage passed through the triple system of lockage was nearly 32,000,000 tons, the vessels averaging 1,410 tons; of this tonnage upward of 22,000,000 passed through one of the three locks. In the two months of July and August the tonnage through the St. Mary's Falls canal was almost exactly equal to the tonnage through the Suez canal during the entire previous year, allowance being made for difference in methods of measurement. With a twelve months' season of navigation, the triple lockage system at the St. Mary's Falls canal would pass 50,000,000 to 60,000,000 tons without serious delay, in vessels of the present average tonnage. If the average tonnage were doubled, making it equal to that of ships now using the Suez canal, the capacity would be considerably greater. The most sanguine promoter of an isthmian canal would not expect this total to be reached in that waterway for a long time to come.

A second lesson is that a canal with locks operated carefully is a safe waterway, as far as the locks are concerned. It is not necessary to give the space to this consideration that its importance seems to warrant, for the proof can be summed in a single sentence. During the forty-eight years since the opening of the St. Mary's Falls canal to navigation the stoppages at locks have probably not averaged two days per year, or one day for 3,000,000 tons passed. With locks in duplicate, the stoppages of navigation are almost nil.

The third lesson is the importance of a wide channel. The unfortunately narrow width adopted for the Suez canal, only about half that originally intended, but made necessary to prevent the cost exceeding twice the estimate, has been a harmful precedent. It has been increased there, and will, doubtless, be further increased as traffic increases. In the channels connecting the great lakes, where 300 ft. width was generally first adopted for the 20-ft. navigation, the width is being increased to 600 ft. or more, and the principle is adopted that the width of channel should be greater than the length of the largest ship. This principle may be considered applicable generally where currents are strong, the traffic great, and the cutting not too deep.

DEVELOPMENT OF THE LAKE VESSELS.

The improvement of the navigated channels has been accompanied by corresponding developments in the dimensions and character of vessels. Before 1870 the greater part of the freight movement was in sailing vessels carrying 300 to 600 tons. In 1872 appeared the first of a new type, consisting of fleets of two or more vessels, one propelled by steam towing the others, except when compelled by stress of weather to cast off lines. The vessels towed, called tow-barges, were sailing ships not fully rigged, but they could take care of themselves in a storm. The first of these were of 600 to 1,100 tons, net register, carrying in freight about twice the registered tonnage. As the opening of the 16-ft. channels drew near, larger vessels were built, and when that depth became available, in 1884, a great many of 1,500 to 1,900 tons, net register, were in use. The increase was most marked in steam vessels. Up to this time, and for several years thereafter, while grain was the largest item of freight and Lake Michigan ports were the principal shipping points, the largest steamers were employed between Lake Michigan and Lake Erie. By 1888, iron ore had become the leading article, and from that time the vessels built for that trade were larger

(*i*) Report of Committee for New York State Canals, 1899.

in tonnage and number than those for any other. During the period from 1888 to 1891, inclusive, the ruling type of freight vessel turned out from the ship yards was of 1,500 to nearly 2,000 tons, net register, carrying 3,000 to 4,000 tons on a draught of 14 to 15 ft. Few sailing vessels or tow-barges were built during this period, except in a single class, the well-known "whalebacks," more generally called "pigs," which, when fully laden, they much resemble. The first of these appeared in 1889. They ran in fleets, one steamer towing one or more barges. They were economical to build and were great carriers, but have not proved altogether successful, and no more are building. By 1892 the preponderance of iron ore, as the leading article of lake commerce, had become established, and from that year the building of ships for this trade has been the leading feature of lake shipbuilding. The near approach of a 20-ft. navigation stimulated each year the building of larger ships. More than half the tonnage of freight-carrying vessels built in 1896, when the last American lock was opened to navigation, was in ships exceeding 2,000 tons, net register. Six years before, not a single vessel of this tonnage was in service. The largest vessels yet put in service were built in 1900. Their net registered tonnage is about 4,500 each, but they carry nearly twice their net register. They are 498 ft. long, over all, and of 52 ft. beam. During the last three years there has been a marked tendency to smaller dimensions, but contracts are now placed for still larger vessels. The building of sailing ships has practically ceased. The tonnage built on the lakes during 1902 was 158,230 tons in 104 vessels, an average of 1,521 tons; while that on the Atlantic and Gulf coasts was 214,538 tons in 856 vessels, an average of 251 tons, or about one-sixth as much. A comparison of steel steam vessels is perhaps more just. Such a comparison shows: For the lakes, forty-four ships of 152,267 total tonnage, or an average of 3,461 tons; and for the seaboard, sixty-two ships of 128,571 tons, or an average of 2,076, the lake tonnage being 18 per cent. greater in amount and the vessels 66 per cent. greater in average capacity. (*j*) The total tonnage on the lakes is a little more than one-third of the total of that of the United States.

The freight on the lakes consists mainly of a few items, and facilities for handling them have reached a greater degree of efficiency than anywhere else. Iron ore is loaded from pockets in lofty piers and falls directly into the hold of the ship. The ore piers have now a storage capacity of nearly 1,000,000 tons. During the last season a ship received its full load of 5,290 tons in 68 minutes, through nineteen hatches. The equipment for unloading is almost entirely perfect, a cargo of 5,300 tons having been unloaded in 3 hours and 45 minutes. Coal is loaded from cars at the rate of 1,000 tons per hour. The use of elevators in loading and unloading grain, mainly a development of lake commerce, is too well known to need further reference. It should not be understood that these periods represent averages, or define the stay in ports. Ore-carrying ships require from one-half to one day in the receiving port and about three days in the discharging port, getting a dock and unloading; coal-carrying ships require about one day more at each end of the route. Grain ships require about one day in the receiving port and two in the discharging port. There is still room for improvement in port facilities. (*k*)

The most remarkable feature of lake commerce is the marvelous development of the mining and shipment of iron ore. In 1888 it exceeded 5,000,000 tons for the first time. It doubled in the next seven years and again doubled in the next six years, passing 20,500,000 tons in 1901. In that year the Lake Superior mines furnished 74 per cent. of the entire amount produced in the United States. In 1902 the output was increased by 7,000,000 tons, making a total of 27,500,000 tons, which was equal to the total output during the thirty years from the first shipment to 1885, while the increase alone was greater than the entire output of any year previous to 1889. While the output in the United States at large doubled between the years 1888 and 1901, the production of the Lake Superior mines quadrupled during the same period, furnishing nearly all the increase in the ore production of the country.

This wonderful development of a few leading articles of freight has resulted in cheaper transportation than known elsewhere, except on long ocean routes. The most reliable and complete data existing are obtained at the St. Mary's Falls canals by the co-operation of the governments of Canada and the United States. The average freight rate on all classes of freight during 1902 was 0.89 mill per ton-mile, the average haul being 827.4 miles. If the freight had been carried by rail the average rate could hardly have been less than 3 mills per ton-mile, and the average haul would have been about the same as by water. On this basis the saving in transportation by the water route during one year was upwards of $76,000,000. This amount of saving on Lake Superior commerce alone, during a single year, is greater by $8,000,000 than the entire amount appropriated by the United States for all harbors and waterways on the lakes above Niagara falls from the formation of the government. Indeed, the saving during one year on a single article, iron ore, would repay all the money expended up to this time on the waterways and harbors which it traverses on its way from mine to furnace. Viewed in this way, no great investment was ever made by a corporation or government with such a magnificent showing of profit. But a far broader view may be taken justly; this water route has not merely afforded a saving in expense of transportation, but has been creative of a large part of the wealth of the nation. Without it the development of our manufactures of iron and steel and other industries dependent on them or related to them, all constituting a great share of the national wealth, would have been retarded or impracticable; without it the prairies of the northwest would have remained unproductive and unpeopled for a much longer time. With these broad considerations in view we may place to the credit of lake transportation a sum perhaps hardly definable, but compared to which the largest above mentioned is a mere trifle.

It must not be assumed that the minimum freight rates for a 20-ft. navigation have yet been reached. Taking iron ore as an example, the average rate for the year 1902, 0.68 mill per ton-mile, was based on unusually high expenses for labor and other items; moreover, the full channel depth, provided for under the present project for harbor and channel improvements, is not yet fully attained. In the Detroit river the average limiting depth is only 19 ft., instead of 20 ft., as intended. The addition of another foot will permit an increase of cargo, in the largest ships, of about 10 per cent., with little increase in cost of transportation. With normal expenses, larger cargoes and further improvements of terminal facilities, a large reduction of freight charges will be certain to occur.

SOME GENERAL PRINCIPLES GOVERNING CHEAP TRANSPORTATION.

From the study of lake navigation some general principles governing cheap transportation may be deduced, which will be applicable to other places.

1.—For the cheapest water transportation there must be adequate depth in the channels, so that large ships can be used. Freight rates on iron ore from Lake Superior to Lake Erie ports were, during prosperous years, about $2 per ton when the limiting depth was 15 ft. and less than $1 with the present limiting depth of 19 ft.

2.—There must be adequate facilities for handling cargo, so that the delay in port may be reduced to a minimum. The lake ports have probably the best facilities existing anywhere, and these are important factors in the low freight rates which obtain, notwithstanding the facts that the vessels lie up four or five months during the year, and during the season of navigation make short voyages compared with sea-going ships. Ore-carrying ships make twenty to twenty-four round trips during the season of seven to eight months, or a mileage of 32,000 to 40,000 miles. The average speeds are 10 to 12 miles per hour. During the last season a ship of somewhat higher speed made 45,340 miles.

3.—Different classes of freight require different rates of speed. Lake ships carrying package freight, some of it perishable, some of high value, run 12 to 14 miles per hour, but for those carrying ore a speed of 10 to 12 miles has been found more economical, conforming closely to the usual speed of tramp ships on salt water.

4.—Transhipment must be avoided as far as possible. The Erie canal, with its 7-ft. navigation and transhipment at Buffalo has shown a steadily decreasing business in the transportation of vegetable foods, and in 1900 carried only one-third as much as 1869, and only one-fifth of the amount in the maximum year, 1880. The Welland canal has barely held its own during the same period, although its depth has been increased from 9 to 14 ft. The New York Central and Erie railroads increased their tonnage in this class of freight six times during the same period. The 14-ft. navigation of the St. Lawrence to Montreal, completing this navigation from the lakes to tide-water and to sea-going ships, has been opened too recently to predict its consequences safely. It still lacks the necessary terminal facilities at Montreal, but neither this lack, nor the hazardous navigation of the lower St. Lawrence from Montreal to the Atlantic, has prevented a great increase in the receipts of grain at Montreal by rail.

5.—The prime requisite, after all, for cheap transportation is the existence of great natural resources in the tributary districts. So much misleading discussion of the benefits of water routes has been indulged in, in recent years; such broad inferences have been drawn from the traffic through the St. Mary's Falls canals as to results to be expected from the opening of other waterways, that it seems necessary to state this truism seriously. The freight tonnage through these canals consists almost entirely of a few articles; first of these is iron ore, which in 1902 was 67 per cent. of the total; next is coal, 13 per cent.; then flour and grain, 10 per cent.; then lumber, 6 per cent; these four articles making 96 per cent. of the total. In the natural course of events the iron ore and lumber will be exhausted; but for their accidental and temporary existence, the traffic would not be more than 27 per cent. of its present amount; and doubtless even less than this because the development of these two articles has powerfully promoted the development of others. The lumber shipments will soon diminish and before many years will practically cease. Ore shipments will reach a much higher amount than the present before the decline, which is inevitable, sets in. In the meantime the shipments of coal and of agricultural and manufactured products will increase, and, possibly, after the exhaustion of the ores the traffic may remain as large as at present or even become much greater. However this may be, it is clear that the present development is due to a combination of agricultural and mineral resources not found anywhere else in the world, and to a spirit of daring enterprise and restless energy hardly paralleled in the history of industrial effort.

(*j*) Marine Review, Jan. 8, 1903.

(*k*) Information in regard to delay in port furnished by Capt. Geo P. McKay of the Lake Carriers' Association, and the editor of the Marine Review, Cleveland.

PHILADELPHIA TRADE NOTES.

Philadelphia, June 17—E. B. Frost has succeeded Isaac L. Rice as president of the Electro-Dynamic Co. and G. Herbert Condict has been appointed vice-president and general manager. The company's large plant on Ionic street is very busy and additions to the machinery equipment are contemplated. This company has the contract to equip the Dacota, one of J. J. Hill's large vessels, now building at New London, Conn., with the Pfatischer electrical steering gear. The same system was recently installed in the Minnesota, sister ship to the Dacota, launched several weeks ago. The Finland of the Red Star Line, now in service over a year, was also furnished with this company's electrical steering gear and a recent letter from officers of that line states that it has given the greatest satisfaction after severe tests. At the present time the company is figuring on contracts to equip five new battleships, building at Russian ship yards, with the Pfatischer electrical steering apparatus, the equipment for each vessel to be of 100 H. P.

James H. Hermiston of the American Bitumastic Enamels Co. is on a visit to the Atlantic coast ship yards on business connected with his company. He will go north as far as Bath, Me. This company is at present working on the following vessels: St. Louis of the American Line, now at Cramp's ship yards; Nos. 5 and 6, large freighters, at the New York Ship Building Co.'s yards; No. 321, freight and passenger steamer, at the Roach yard, Chester. These vessels are receiving a coating, where needed, of bitumastic enamel, which, as known, is used for the preservation of iron, steel, galvanized and corrugated iron, and wooden surfaces, etc. In the vessels named especial attention is being given to the double bottoms and bunkers. The other products of the company, bitumastic cement for ship's bulges, and bitumastic covering for tank tops under boilers, will also be used where needed.

Works of Alfred Bax & Co., recently damaged by fire, communicated from a neighboring warehouse, will shortly be in better shape than ever and the facilities of the company for the manufacture of their well-known anchor windlass greatly increased.

The St. John Grate Bar Co., which has offices in the Betz building, has placed an excellent exhibit of their grate bars in the machinery department of the Bourse. The list of letters commendatory of the St. John grate bar received by the company has lately been augmented by a number from leading ship builders and it is almost certain the grate bars will form part of the equipment of the latest United States battleships.

The Link-Belt Engineering Co. has closed a large contract for transmission machinery to be used in the mines of South Africa and for aiding in the loading of vessels.

Isaac L. Rice, former president of the Electro-Dynamic Co. of Philadelphia, is president of the Electric Boat Co. of New York and is now in Europe on business connected with that company.

The Carley Life Float Co. has just received an order for the equipment of the Czar's private yacht, Svetlana, with its float. While this order came through the Russian board of admiralty, it was largely due to the recommendations of Capt. W. Baron Fersen, formerly naval attache of the imperial Russian embassy at Washington, D. C., and that of Com'dr Boutakoff, also a representative of the imperial Russian embassy, and now stationed at Washington. Both gentlemen have freely recognized the superior merits of the Carley float over all others, and have for some time been earnest advocates for its adoption on all seagoing vessels. It is understood that the floats ordered for his imperial majesty's yacht are to be thoroughly tested with a view to their installation on all the ships in the Russian navy. The company is thoroughly protected by letters patent in Russia as well as in other foreign countries, and a large business abroad is confidently anticipated in the near future.

U. S. Engineer Office, 815 Witherspoon Building, Philadelphia, Pa., June 18, 1903. Sealed proposals for constructing two steel, twin-screw, suction dredges will be received at this office until 12 o'clock, noon, July 18, 1903, and then publicly opened. Proposals for constructing both dredges or one will be received. Information furnished on application. J. C. SANFORD, Captain, Engineers. July 9.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	276,460 H. P.
English Royal Navy	849,300 "
Russian Imperial Navy	193,900 "
Japanese Imperial Navy	122,700 "
Austrian Imperial Navy	32,900 "
Italian Royal Navy	13,500 "
Chilian Navy	26,500 "
Argentine Navy	13,000 "
The "Messageries Maritimes" Company	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500 "
Total Horse Power of Boilers in Use	1,634,360

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

United Marine Mfg. & Supply Co.,

MANUFACTURERS OF AND DEALERS IN

ELECTRICAL MATERIAL

FOR SHIPS AND FORTIFICATIONS.

ALBERT C. JAHL, General Manager,
100 William St., New York, U. S. A.

THE C. O. BARTLETT & SNOW CO.

The C. O. Bartlett & Snow Co. of Cleveland have just taken an order to furnish the Cleveland Gas Co. with a conveyor and elevator for handling 200 tons of coal and coke per hour. This company recently installed a similar conveyor in the yard of the Aetna Portland Cement Co. at Detroit. A growing feature of this company's business is the making of dryers for crushed coal. The company is about to ship a dryer to the Schwartzkopf Coal Dust Firing Syndicate, Haydock near St. Helen's, England. This concern was much impressed with the performance of one of the company's drvers and ordered one sent to England. The dryer will have a capacity of 10 tons an hour. Mr. Bartlett insists that equal combustions cannot be secured from coal of varying size and moisture. It must be dried and reduced to powder to obtain perfect combustion and perfect freedom from smoke. It requires 140 ft. of air to consume one pound of coal and both air and coal must be fed regularly. Some experiments which the company has made in its own plant show that by drying and reducing to powder 30 per cent. of the fuel can be saved and 20 per cent. of the cost. The C. O. Bartlett & Snow Co. will have its own crushing and drying plant in operation in about six weeks. The company is confident that it can solve the smoke problem completely.

The latest catalogue of the company deals with paint machinery. This is an additional catalogue to the general catalogue. The catalogue is carefully indexed and illustrated. Nothing in the line of paint machinery is lacking in it.

Mr. William Burlingham has accepted an appointment as chief engine-designer with the B. F. Sturtevant Co. of Hyde Park, Mass., resigning a position in the United States inspection office with the Wm. R. Trigg Co. of Richmond, Va. Mr. Burlingham had previously been associated with the Bath Iron Works, the General Electric Co., the Southwark Machine & Foundry Co. and the Newport News Ship Building & Dry Dock Co. He has also served on Mr. T. A. Edison's staff at the East Orange laboratorv and is a graduate of the Worcester Polytechnic Institute.

Pilling & Kruse Air Motor Co. is the name of a new concern which has been started at Bucyrus, O., to manufacture compressed air machinery. Mr. J. L. Pilling, the organizer of the company, was lately connected with the Port Huron Air Tool Co. of Port Huron, Mich.

Mystic Shriners Imperial Council at Saratoga, N. Y., July 7-10, excursion rate, one fare for the round trip by way of the Nickel Plate road. Tickets on sale July 5 and 6, good to return July 20. Full particulars at nearest ticket office, or address E. A. Akers, C. P. & T. A., Cleveland, O. 102, July 2.

reaching the marine trade

is best accomplished through the Blue Book of American Shipping.

An advertisement in the Blue Book is a passport into every ship yard and steamship office.

If you are a manufacturer of anything used in a ship yard or aboard ship, the Blue Book is a constant letter of introduction to the consumer of your products.

It is a fixture on the desks of ship builders, engine and boiler builders, steamship managers, wrecking companies and in all pursuits allied to navigation. It is consulted daily.

Your advertisement can no more escape observation than virtue can its ultimate reward.

The Blue Book is the only marine directory published in the United States. The 1903 edition is now in course of preparation. Its field is so well defined, and it stands so close to its trade that an advertisement in it cannot fail to bring results. It does not appeal to an indiscriminate and general public but to the man who wants the goods you make.

Fullest information regarding the scope of the Blue Book will be given to any advertiser upon request. But promptitude is a necessity. The day the Blue Book comes from the press is only a few weeks off.

ADVERTISING RATES ARE:

Full page - -	$75.00
Half page - - -	40.00
Quarter page - -	25.00

MARINE REVIEW PUBLISHING CO.,
39-41 Wade Building,
Cleveland, Ohio.

BROAD INVESTIGATON OF THE SHIPPING QUESTION.

The appointment of a special committee by the New York Board of Trade & Transportation to consider what steps are needful to bring about a revival of the American merchant marine in foreign trade has aroused widespread interest, both in this country and in Europe. Letters from all sections of the United States and abroad are pouring in to the committee asking for information concerning the character of the investigation to be taken. With a view to making clear the action of the board in appointing a special committee to inquire into the decline of American shipping Aaron Vanderbilt, chairman of the special committee, has issued a statement. Mr. Vanderbilt says that the committee's investigation will be of the widest character. The statement follows:

"We have with deep concern been watching our shipping in the foreign trade steadily decline for many years, hoping something would be done to remedy matters. We see a great business of ocean transportation to which the United States is one of the largest contributors, in which the finest ships afloat are engaged, and whose earnings run into the hundreds of million dollars annually, in which American shipping participates to the extent of less than 10 per cent. As in 1861 the United States had three times as large a tonnage engaged in ocean transportation as we now have, we want to know what has caused the decline, especially as the present value of our foreign commerce is four times larger than it was in 1861. We want to know why our people don't build the larger part of the ships that carry our foreign commerce and why our own people don't own and operate them. Our purpose in trying to find it out is in order that in the discussion some thoroughly practicable, effective and acceptable solution of the problem, how best to proceed to remedy this condition may be evolved. This we believe to be a timely, a commendable and popular undertaking.

"The action of the Board of Trade & Transportation in appointing a committee to investigate the decline of American shipping in the foreign trade has called forth expressions of approval and support in all parts of the country that are both gratifying and inspiring. It cannot be said too emphatically that the committee does not purpose turning its back upon nor ignoring any suggestion. The advocates of free ships are as welcome to us as are the advocates of large subsidies, and the believers in discriminating dues and duties will have the same opportunity to present their arguments that is given to the subsidy and free ship advocates.

"We shall ask the free ship advocates to explain whether they believe that foreign ships should be admitted to our coastwise trade or confined wholly to our foreign trade, and whether they would have the laws repealed that require that the masters and officers of American vessels shall be American citizens. Most of all, in respect of this particular phase of the discussion, we desire to know how effective free ship laws in other countries have been in building up their merchant shipping, especially in Great Britain.

"We shall ask the subsidy advocates to make good by acceptable proofs their assertions that subsidies stimulate the building and economical operation of ships, and especially the claim that the subsidies which come from the people go back to the people in the lower freight charges resulting from subsidies. We shall also want to clearly define the dividing line between 'pay for carrying the mails' and 'subsidies and bounties.'

"We shall ask the discriminating dues and duty advocates to say how best the practical and seemingly serious difficulties of abrogating or denouncing some thirty or forty treaties and conventions that we now have with as many different countries can be overcome without undue international friction; whether they believe the discrimination should be through a reduction of the dues and duties now in force on American ships and on the imports carried therein, as compared with foreign ships, or whether foreign ships and the goods they import should pay higher dues and duties than they now pay, and how we could discriminate against ships bringing imports that are free of duties and ships that come here in ballast; also how serious the retaliation by other countries would be if this system were adopted and how such possible retaliation could be met without placing a check upon our export trade.

"The great political parties have been promising for many years to enact legislation to build up our shipping in the foreign trade, but so far nothing effective has been accomplished. Perhaps the business people, the farmers and the wageworkers can evolve a plan which will command the support of both parties and which can be discussed without partisan bitterness."

SHERWIN-WILLIAMS CO.S. PLANT AT MONTREAL.

The new plant of the Sherwin-Williams Co. of Cleveland which is now being erected at Montreal will be the largest of its kind in Canada. The buildings comprise a four-story office and warehouse with a frontage of 280 ft. and a depth of 50 ft.; a paint factory immediately in the rear of the office and warehouse building, four stories high, 220 ft. long and 50 ft. deep, and a modern power house, 103 ft. long and 72 ft. deep. The buildings are made as nearly fireproof as possible by the erection of fire walls and the enclosing of the staircases in brick walls. The floors are of mill construction. The grouping is such as to admit plenty of light and air. The buildings were designed entirely by the architect of the company's own staff. The main entrance to the new plant, which will be through the office and warehouse building and intended for the use of both factory and office employes, will be of cut stone in the Doric style of architecture. In the gable of the pediment the trademark of the company will be hewn out of the stone. The vestibule will have marble wainscoting, marble steps and tile floors. The warehouse capacity of the plant will be more than double that of the old one.

The factory building will be equipped throughout with the most modern and approved machinery. The company has its own machine shops and designs and builds its own mixers and mills. The machinery will be electrically driven, each department having its own motor. Throughout the entire plant labor-saving devices, such as hydraulic lifts, will be installed. A tin can factory will be a feature of the new facilities. The power house is to be equipped with two Corliss engines, one of about 130 H. P., the other about 200 H. P. These will drive two Westinghouse alternating generators, one of 75 kilowatts, the other of 120 kilowatts, furnishing electrical power for the entire plant. The buildings are so arranged as to facilitate the handling of goods in the speediest and least laborious way. The company has its own sidings, the Grand Trunk railway running switches into the grounds, one for bringing in raw materials, another for handling the finished products, and a third for supplying coal to the power house. An interesting feature of the new factory will be the industrial betterment of the company. A lunch room with well-appointed kitchen annexed, a club room, shower baths and rest rooms for the women will be installed and practically the same privileges that are enjoyed in the large Cleveland plant of the company will be inaugurated.

KINGSTON NOTES.

Kingston, Ont., June 17.—The new freight steamer Westmount, for the Montreal Transportation Co.'s fleet has arrived here and will be engaged in the trade to the head of Lake Superior. She takes the place of the steamer Bannockburn, wrecked last year. The new steamer, entirely of steel, cost nearly $200,000, and was built by Swan & Hunter, Newcastle-on-Tyne. She is 252 ft. long, of 42 ft. beam, and will draw 18 ft. when fully loaded. She brought a load of railroad iron from Europe and took thirteen days to cross the Atlantic. The engines are triple-expansion and quite powerful, as the steamer is designed to tow if necessary two large grain barges. She will carry about 100,000 bu. of grain. Breck & Halliday of this city will install an electric lighting plant on the new steamer.

Capt. Thomas Donnelly, formerly inspector for Inland Lloyds, has been appointed to the surveyorship of Bureau Veritas (French register). The appointment was made at Paris and gives Capt. Donnelly control as inspector of steel vessels on the Canadian side of the lakes from Port Arthur to Montreal.

Robert Palmer & Son, Noank, Conn., are to build three barges, each 240 ft. long, for the Philadelphia & Reading railway.

National Educational Association convention, Boston, July 6 to 10, very low rates and special inducements via Nickel Plate road. Tickets on sale July 2, 3, 4 and 5, good returning July 12, subject to extension of return limit to Sept. 1, if desired. See nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O.
99, July 2.

Star Metaline Bushing.

SELF-OILING.

NEW METAL
CARGO HOISTERS

Wrought Iron Hook and Strap, Galvanized Iron Shells and Sheaves. Sheaves fitted with Genuine Star Metaline Bushings with Metaline Side Bearings.

These Blocks Save the Rope and Outwear all others.

Send for 1902 Catalogue M. A. R. FREE.

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BOSTON & LOCKPORT BLOCK CO.,
BOSTON, MASS. - - LOCKPORT, N. Y.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the Highest Grade for Locomotive, General Machinery and Shipbuilding Work.

Subject to U. S. Government, Lloyds, Railroad and Other Highest Requirements.

Seaboard Steel Casting Co.,
Chester, Pa.

A BILLION AND A HALF FOR THE NAVY.

Capt. Richard Pearson Hobson at any rate takes himself very seriously. He announced in New Orleans a few days ago that he resigned from the navy in order to inculcate a feeling into the American people of loyal support to the naval arm of the government. He believes that the United States should be the premier naval power of the world and to that end is endeavoring to stimulate interest in naval affairs. The ship builders surely will encourage him, for among other things he advocates the expenditure of $1,500,000,000 during the next twelve years for new ships. This is what Capt. Hobson says:

"I am now engaged in a campaign covering the whole country in advocacy of the taking by America of an important part in the world's affairs. As a means to this end I am advocating American naval supremacy. I recognize the great importance of such action from my observations during years of a service that has covered most of the world, and that has involved years of duty ashore in Europe and Asia. This observation has shown me that a great transformation process is now going on in the world—a transformation brought about by an age of science that has revolutionized affairs, bringing in an era of industrialism that is destined to overthrow the era of militarism that has continued during so many centuries. My observation has shown that, while the process of industrialism is working internally in Europe, Europe is still in the grasp of militarism, and that it is America that essentially embodies the new era of industrialism. America is thus constituted in a sense the great agent for carrying to all the world the blessings of the new era that calls for peace and universal justice as against war and the oppression of the weak by the strong.

"It is thus a duty for America to step forth and play a paramount role in world affairs, and such a role depends in America, more than in any other country, upon her navy. It calls for nothing short of American naval supremacy. Besides, I find that American coastwise property, property on her coasts, bays, harbors and rivers, and her shipping property on the various waters, exceed those of all Europe combined, and that her exports to foreign markets are greater than those of any other country. The security of all these interests rests alone with our navy, and thus interests as well as duty call for naval supremacy.

"I am advocating a consecutive and on the whole conservative progress, involving an expenditure of about $1,500,000,000, covering twelve years, which would give us the first place as a naval power. My plan contemplates starting with an appropriation for new ships of about $50,000,000 for the first year, $60,000,000 for the second year, and so on. This seems extravagant on its face, but when it is measured along with the incalculable resources of the nation it will be seen that it means less than one-tenth of 1 per cent. increase in taxation. Our resources are vast. We do not have the expense of a standing army. We leave all our strong men engaged in productive pursuits. Thus the construction and maintenance of the greatest navy in the world would not be burdensome. Moreover, it would be a perfect guarantee of peace, and safeguard us against the vast drain of war. Also I desire to call attention to the fact that the naval power, fortunately, does not involve a tendency to militarism. It is the natural form of power for a nation which stands for industrialism and peace. The industrialism of America is increasing daily. The responsibility a great navy would entail would be a rational offset as against the tendency to materialism and sordidness. I am advocating this policy throughout the United States, and hope to see the action taken before many years which will put it in execution."

NEVADA'S TURRET ROLLERS DAMAGED.

Rear Admiral Francis T. Bowles, chief naval instructor, has authorized the following statement regarding the recent trials of the monitor Nevada off the Virginia coast:

"The second trial of the 12-in. turret of the Nevada, conducted by the board of inspection, resulted in some damage to the rollers on which the turret revolves after firing two 12-in. guns simultaneously, with full charges. Simultaneous firing of two guns by electricity is an unusual test. The turret operated satisfactorily after firing a number of single shots under various conditions of elevation. The board recommended fitting an additional number of rollers of different material and adding some additional bolting, and the recommendation has been approved by the bureau of construction and repair."

It is expected that the British navy will be increased in the coming year by the completion of six battleships, eleven armored cruisers, one second-class cruiser, two sloops, four destroyers, eight torpedo boats and three submarines. Nothwithstanding this large augmentation a new program has been advanced, comprising four first-class armored cruisers, three third-class cruisers, four fast scouts, fifteen destroyers and ten submarines.

A Marconi money order for £5 was paid by the Cunard Steamship Co. at sea the other day. A passenger handed a lace vender a £10 note instead of a £5 note and the mistake was not discovered by the Irishwoman until after the ship had gone. She handed £5 to the representative of the Cunard company at Queenstown. The steamer was caught by Marconigraph in mid ocean and the £5 refunded to the passenger.

Marine Boilers for Sale.

Two Scotch marine boilers for sale, size 8x12 ft., in good condition, at Toledo, O. Two furnaces in each boiler 3x9½ ft. Have all steam and valve connections. Address, Geo. P. Felcher Milling Co, Whittemore, Iosco Co., Mich. June 18

For Sale.

One 18x6 Air Hoist Cylinder, two round ore buckets, bottom dump 26x36. Harris Machinery Co. Minneapolis, Minn. July 16.

U. S. Engineer Office, Detroit, Mich., June 18, 1903. Sealed proposals for building concrete superstructure on main pier at Sand Beach harbor of refuge, Mich., will be received here until 3 P. M., standard time, July 18, 1903, and then publicly opened. Information furnished on application. LANSING H BEACH, Major, Engrs. July 16.

Sealed proposals will be received at the office of the Light House Engineer, Buffalo, N. Y., until 12 o'clock, M., Friday the 17th day of July, 1903, and then opened, for furnishing the materials and labor of all kinds necessary for establishing a light and fog-signal station on the new pier head at the end of the west breakwater at Ashtabula, Ohio, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to Maj. T. A. BINGHAM, U. S. A., Engineer, Tenth Light House district. July 2.

Boiler and Engine for Sale.

Both in first-class condition. Boiler 10½ ft. in diameter and 14 ft. long; 120 lbs. steam allowed. Fore and aft compound engine; high-pressure, 22 in. diameter low-pressure, 44-in., with 36 in. stroke. Address Barry Trans. Co., East End Michigan St., Chicago, Ill. t f

Position Wanted by Ship Designer and Builder.

Responsible position wanted to assist in designing and building all kinds of ships—steam and sail. Address Box 45, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. July 2.

For Sale Cheap.

Steamer International, 86 ft. long, 26 ft. beam, draught 9 ft. Fitted out and run this spring. In first-class condition.

Steamer John Haggart (Canadian), 100 ft. long, 18 ft. beam, draught 6 ft. In first-class condition. Running at present.

We have sold out our ferry business to Soo International Traction Co. and have these two boats left. Address Joseph Ganley, Sec'y and Treas., Sault Ste. Marie Ferry Co., Sault Ste. Marie, Mich. June 18

Steamer and Tow Barge for Sale.

For Sale—Canadian steamer Orion, class A-2. Capacity 30,000 bushels of wheat or 500 M ft. of lumber or 900 tons coal.

Canadian tow barge Muskoka, A-2. Capacity 30,000 bushels wheat, or 600 M ft. of lumber, or 900 tons coal.

For particulars apply to Collins Bay Rafting & Forwarding Co., Ltd., Kingston, Ont. June 18.

WHITE OAK

TIMBERS, PLANK AND DIMENSION STOCK

F. S SHURICK,

18 Broadway, NEW YORK CITY

The Little Red Book

of appointments of Captains and Engineers for the season of

1903

IS JUST FROM THE PRESS.

A new list in the book this year shows the capacity in iron ore of every vessel that is suited to carrying iron ore. This ore capacity list is made up from averaging all cargoes for 1902

PRICE $1.00.

MARINE REVIEW PUB. CO.,
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CLEVELAND, O.

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140 CONGRESS ST. BOSTON.

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Metals

Known for any Purpose.

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Price and Quality Guaranteed and Always Consistent with the Market.

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GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

Steel Ship Builders—

We have under construction a complete Ship Building Plant, modern in every detail and capable of handling the LARGEST SHIPS which the trade of the Great Lakes will require; also

Floating Dock—

A Floating Dock of all steel construction and equipped with the best pumping machinery and appurtenances, and with a capacity for Docking the largest Boats afloat or which may be built.

Marine Engines—

We build High Grade Engines for Lake and Ocean Service.

Propeller Wheels—

Improved designs of high efficiency, made of Semi Steel, either whole or sectional.

Hydro Carbon System—

We are the sole owners of the rights for applying this system to the Steamers of the Great Lakes. If your boilers are using too much coal, if you are short of steaming capacity, if you want to convert the objectionable black smoke into money, the HYDRO CARBON SYSTEM should receive your attention, as it successfully and economically handles each of the above cases.

Hydraulic Dredges—

We build all sizes for any service.

Marine Repairs—

and Supplies of all kinds, and Heavy Forgings.

THE BABCOCK & WILCOX COMPANY,

NEW YORK AND LONDON.

FORGED STEEL WATER TUBE MARINE BOILERS

362,000 Horsepower in the United States Navy. 186,000 Horsepower in the British Navy.
225,000 Horsepower in the American Merchant Marine.

Recommended by Boiler Committee, appointed by Lords Commissioners, British Admiralty, for

LARGE CRUISERS AND BATTLESHIPS.

No Cast Metal.
No Bent Tubes.

No Screwed Joints.
Lightness.
Accessibility.

No Automatic Devices.
Safety Under High Pressure.

Bayonne, New Jersey, U. S. A.
Paris, France.
—WORKS:—
Renfrew, Scotland.
Oberhaussen, Germany.

For High-Grade Installations in the Navy and Merchant Marine

THE NICLAUSSE BOILER

609,000 Horse Power in the Navies of

ENGLAND, UNITED STATES, FRANCE, GERMANY, JAPAN, RUSSIA, ITALY, SPAIN, TURKEY, CHILE, ARGENTINE REPUBLIC.

105,000 HORSE POWER IN THE UNITED STATES NAVY.

Manufactured by THE STIRLING COMPANY, CHICAGO, ILL.

Screw Propeller Computer

(McDERMOTT)

For quickly determining dimensions and proportions of screw propellers for any set of conditions.

$5.00

The Roberts Boiler Co.

Has Built Nearly 1,500 Boilers to Date.

For Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-wheelers, Canalers;
Also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service;
Also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every boiler warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 lbs. of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

The Roberts Safety Water-Tube Boiler Co.

Works, Red Bank, N. J.

39 and 41 Cortlandt St., NEW YORK CITY.

TELEPHONE: { NEW YORK OFFICE, 599 CORTLANDT. / OFFICE OF WORKS, 49 RED BANK, N. J. Cable Address, "BRUNIVA, N. Y.

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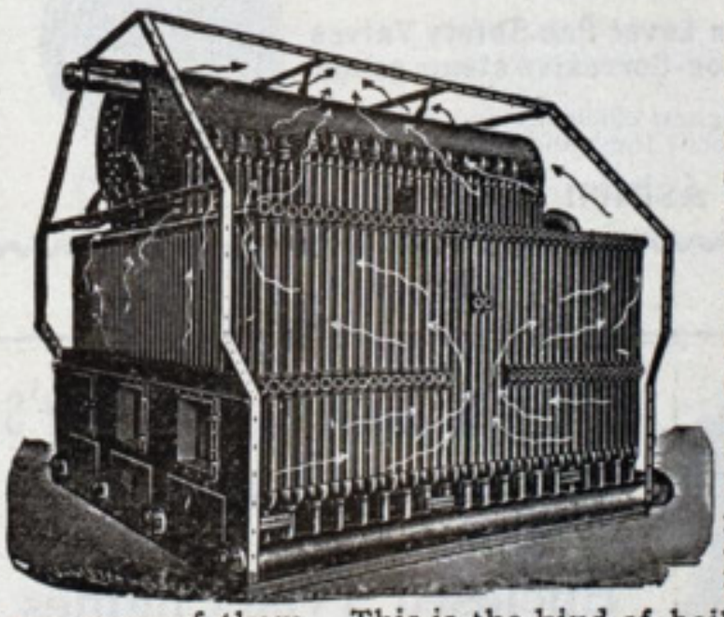
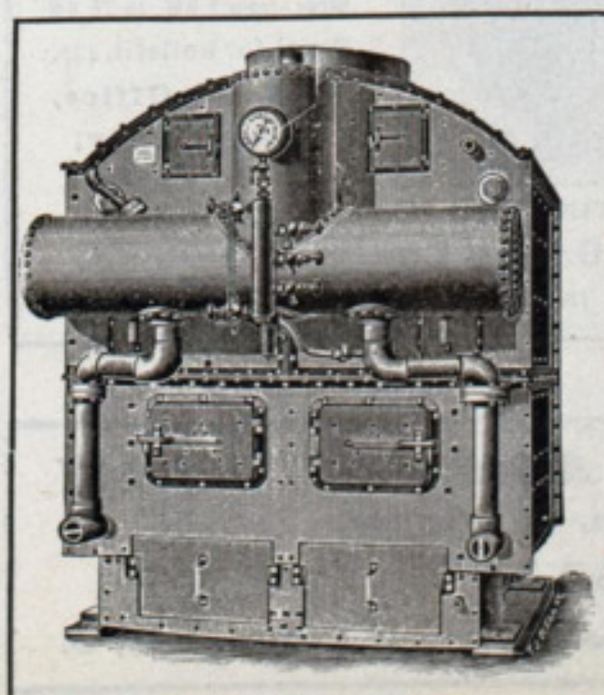


But we want you to think. The Taylor Water Tube Boiler is daily proving itself the most economical and durable boiler on the market. Light, compact, powerful, it never primes and carries as steady a water line as a Scotch Marine. Look at the cut and notice the good points; then write us and we will show you more of them. This is the kind of boiler you can use 24 hours a day year in and out. Just the thing for that new tug.

TAYLOR WATER TUBE BOILER CO.,

400 Franklin St., DETROIT, MICH.



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NOW EQUIPPED WITH

ALMY'S PATENT SECTIONAL Water-Tube Boilers

BEAR EVIDENCE OF THEIR

Excellent Qualities

ALMY WATER-TUBE BOILER CO.

PROVIDENCE, R. I.

BUFFALO ENGINES

For
MARINE
LIGHTING
PLANTS

COMPACT
DURABLE
ACCESSABLE

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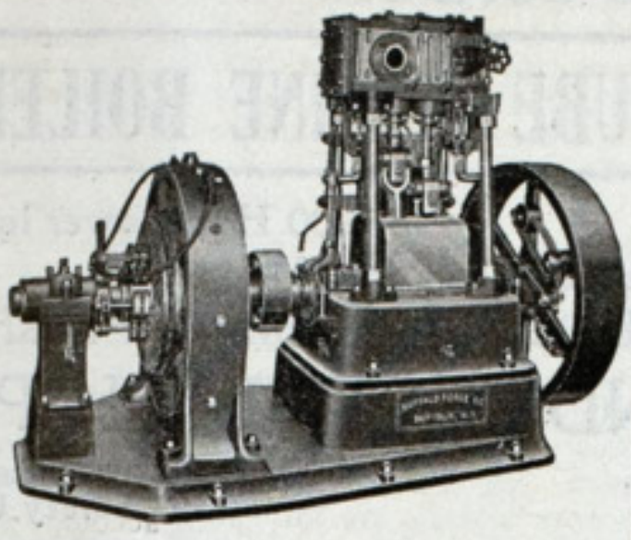

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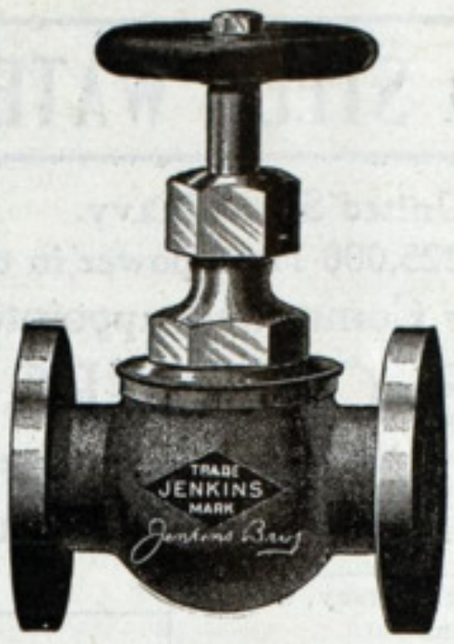

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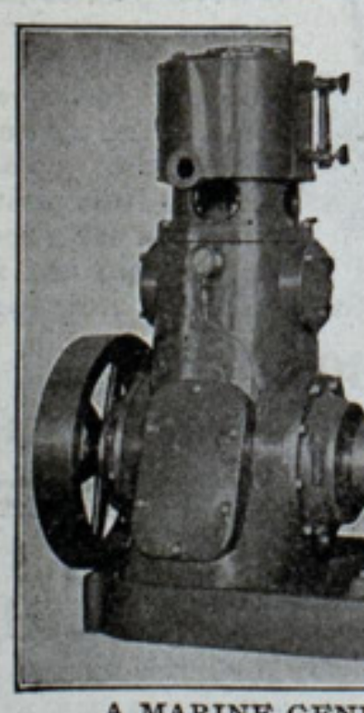

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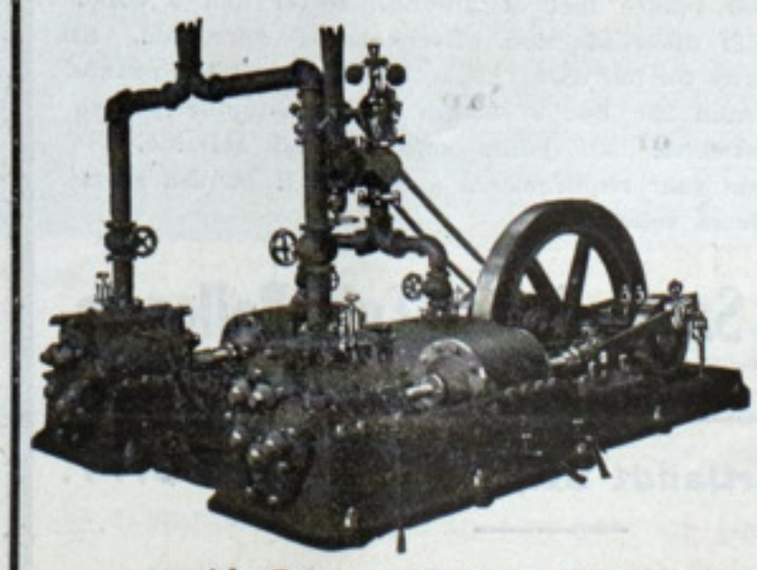

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